THE AMERICAN GAS LIGHT JOURNAL

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PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

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[OFFICIAL CIRCULAR.]

American Gas Light Association.

OFFICE OF THE AMERICAN GAS LIGHT ASSOCIATION,
32 PARK PLACE, NEW YORK CITY, July 13, 1885.

The return of midsummer should remind us that the time for our annual convention is rapidly drawing near, and at the same time warn us that we must turn our thoughts toward Cincinnati if we wish to make our Thirteenth Annual Meeting a success. True, three months are ours during which all needful preparations may be made; but this period is not too much; on the contrary, every day remaining is needful, because our convocation cannot be of any value unless we have an ample supply of good papers—and essays of merit cannot be produced if their preparation be deferred to the last moment. Moreover, as I stated in my appeal to the members a year ago, papers coming before a technical convention have a twofold value—firstly, that due from the information contained therein; secondly, that resulting from the discussion to which they give rise. It must also be clear that the intrinsic worth of the discussion is directly in proportion to the facts and figures presented by the speakers. A general conversation on any given branch of our business, during which mere expression of opinions are voiced, is of but scant worth when contrasted with a discussion in which the members are able to back up their remarks by abstracts from their books or by records of some experiment; and it is equally apparent that members cannot thus prepare themselves with facts and figures unless they know in advance the nature of the subjects to be discussed. Therefore, a paper to be read at our coming meeting, to be of the utmost value, must be prepared, or at least its title and general tenor must be determined upon, sufficiently in advance to permit the Secretary to transmit the information to the members ten days or so before the meeting.

As an instance of the increase in worth which attaches to a paper by reason of the publication of its title in advance, let me cite the essay read by Mr. C. H. Nettleton, at our Washington meeting, on "Testing Meters." There we had a paper of great merit, whose value was enhanced by the facts and figures given in the discussion; for the member, notebook in hand, gave to the meeting the actual results of meter testings as made by his company. Hence this paper and the discussion to which it gave rise form a most valuable addition to our knowledge of this subject. But if it had not been known in advance that a paper on this subject was to be presented, of what import would the remarks of the speakers have been if they had—speaking from memory rather than reading from the record—merely stated their general impressions of the results obtained by them?

From these considerations I am very earnest in urging on the members to turn their thoughts now, even in this hot weather, towards our autumnal meeting; and to select a theme for a paper so far in advance that I may have an opportunity to do my part by getting the members to prepare themselves for the discussions.

Though it is difficult to select a subject for an essay which is new, it is not a hard task to write something new on an old theme. The simplest matters in connection with our business present themselves differently to the various members; it is therefore but light work to present in a new phase even an old-time subject.

During the last year economy has been the watchword in the gas business more than ever before; and if, in the effort to produce cheap gas, any member has been able to make two blades of grass grow where but one grew before, let us all have the benefit of the information—provided that the combined value of the two blades at least equals the worth of the one which previously occupied the soil.

So many works have now adopted the improved furnaces, in some style or other, that surely we ought to have a most interesting discussion of this subject.

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A man who would take for the subject of a thesis the simple words, "Cooling Gas," would indeed show some bravery, for how many members would imagine that such a title could stand at the head of an interesting paper? Yet the subject is one of great depth; for if gas is deteriorated by exposure to a very low temperature, there is possibly ground for the opinion that unnecessary lowering of the temperature of the gas by even a few degrees is harmful, and that, therefore, the degree of heat or cold to which the gas will be exposed in transit from the works to the burner should determine the degree of condensation.

In like manner through all departments of our business even the most threadbare subjects will be found, on close examination, to contain some new feature which might with advantage be made the subject of a paper for our coming meeting. C. J. Russel Humphreys, Secretary.

MR. McILHENNY'S EXPERIMENTS IN THE DIRECTION OF IMPROVED METHODS IN BENCH FIRING.

While on a recent visit to the city of Washington, D. C., we had the great pleasure of meeting with that big-hearted gas man, Mr. Geo. A. McIlhenny, the President-Engineer of the Washington Gas Light Company. To say that our reception was of the right friendly and brotherly sort needs no chronicling here, and it gives us the most sincere pleasure to say that the health of our tried and trusty friend is making excellent progress. To his intimates in our common business this information will be received with joyous acclamation, for Gentleman George has been a patiently heroic sufferer; and to behold him with us once more in the full possession of his old-time sprightliness will be matter for general congratulation.

It has been and is well known that for some years past Mr. McIlhenny's attention has been largely directed to study and experiment in the line of working out the problems involved in the construction and operation of improved methods of bench firing. This investigator has met with the usual vicissitudes common to experimenters, but, with the energy characteristic of the man, partial success or seeming failure acted but as a spur to urge him on in his self-appointed task; and we may here say that his latest achievements are likely to bring him that satisfaction which accrues to one who, after long and wearisome attempt, "comes out of battle a conqueror." Knowing that a knowledge of Mr. McIlhenny's latter experiments has been waited with no small degree of expectancy, we availed ourself of our recent visit to gather some few particulars concerning his work, and a personal inspection of the new benches in operation at the Washington plant revealed the following:

The two benches constructed on the new plan are in settings of sixes, the size of retorts being 15 in. by 26 in. by 9 feet in the clear. The first of these benches had been in operation, at the time of our visit, for a space of four months, while the second was under fire a trifle over five weeks. The furnaces are located in arches in cellar under benches, and are fed, through an opening in floor leading to furnace, with hot coke drawn from certain retorts at the time of drawing the charges. The primary air supply to furnaces is admitted through an opening in furnace door, and the quantity of air admitted is regulated by a slide that can be easily adjusted to the desired or requisite point.

The supplementary air supply is taken in at top of bench, passes up and down through flues built around the uptake flues from bench, then passes over top of bench, and down on each side of the arch about midway between front and rear of oven to the center flues. This supplementary supply is forced into a conveyer pipe, and thence into the heating flues by means of an ordinary blower; and its supply may be regulated as to quantity by an arrangement similar to that pursued in controlling the primary air supply. The gases from furnace combustion are delivered into a flue running the entire length of bench, the top of this flue being about 12 inches above floor level of retort house. The top section of this flue is provided with ports or openings for the escape or admission of the gases into the combustion chamber. These ports are about four inches square, and are divided in space between the front and rear of bench. On each side of this flue are the flues for carrying the supplementary air supply. The openings or ports out of these are about four inches by three-quarters of an inch, and are located on each side of furnace ports, thus bringing the heated air and furnace gases in immediate contact, thereby securing a most thorough combustion in the heating chamber.

From experience Mr. McIlhenny found that the ports for furnace gases as at first devised (or of the dimension mentioned above) were rather too large for the purpose. He afterwards corrected this by throttling them, and by this means obtained much better combustion and heating results. The throttling was done by sliding in bricks placed edgwise over the centers of openings, leaving their orifices of about the same size as those allotted for the supplementary air supply. Since this plan was adopted the combustion in combustion chamber is about as near perfection as it is possible to attain. We are inclined to think that a great portion of the benefit accruing from the throttling system arises from the direction taken by the furnace gases after they impinge on the brick covering the ports. In consequence the furnace gases are thrown with greater directness and contact with the heated air—thus causing a more correct commingling of them with the air, and securing better combustion in the bench.

The furnace bars need shaking up once in 24 hours, and clinkering may be required once in 48 hours—although thus far but little clinker has been developed. The character of the heat produced is vastly different from that which one is accustomed to behold in benches worked under the old firing system. It is seemingly mild in appearance and action; but, at the same time, its intensity is vouched for by its thorough carbonization of the charges in the retorts. The heat is so uniform that it must add greatly to the life and durability of retorts and settings; and that such is the case is borne out by the benches under which the tests were made—the heats do not appear to have exerted any very destructive influence upon the materials used in their construction. There appears to be less loss from heat radiation under this system than from that of any other plan examined by us. Scarcely any indication of heat issuance from chimneys was perceptible; and this is all the more remarkable when it is noted the chimneys extend only perhaps 5 feet from top of benches. The heat is utilized in the bench, there to perform its proper function.

From Mr. McIlhenny's figures it is shown that, with four-hour charges, he carbonizes between 350 and 380 pounds of coal per retort—or from 5½ to 6 gross tons of coal per day per bench. This result is secured at an expenditure of 20 per cent. of coke product of bench. He asserts that, with the new practice, stopped stand-pipes, or pitchy accumulations in hydraulic main, are things of the past. Since the practical working of these two benches had been instituted he has had no trouble of that sort.

He is now preparing to erect a double stack on the new plan—the new construction to contain benches of sixes, as his present arches will permit of no more elaborate settings. It is his intention, in the near future, to erect a stack for the accommodation of benches of nines; and when such arrangement is a fixed fact, he claims that, judging from and being guided by results so far obtained, he will obtain a per diem yield of 100,000 cubic feet to the bench.

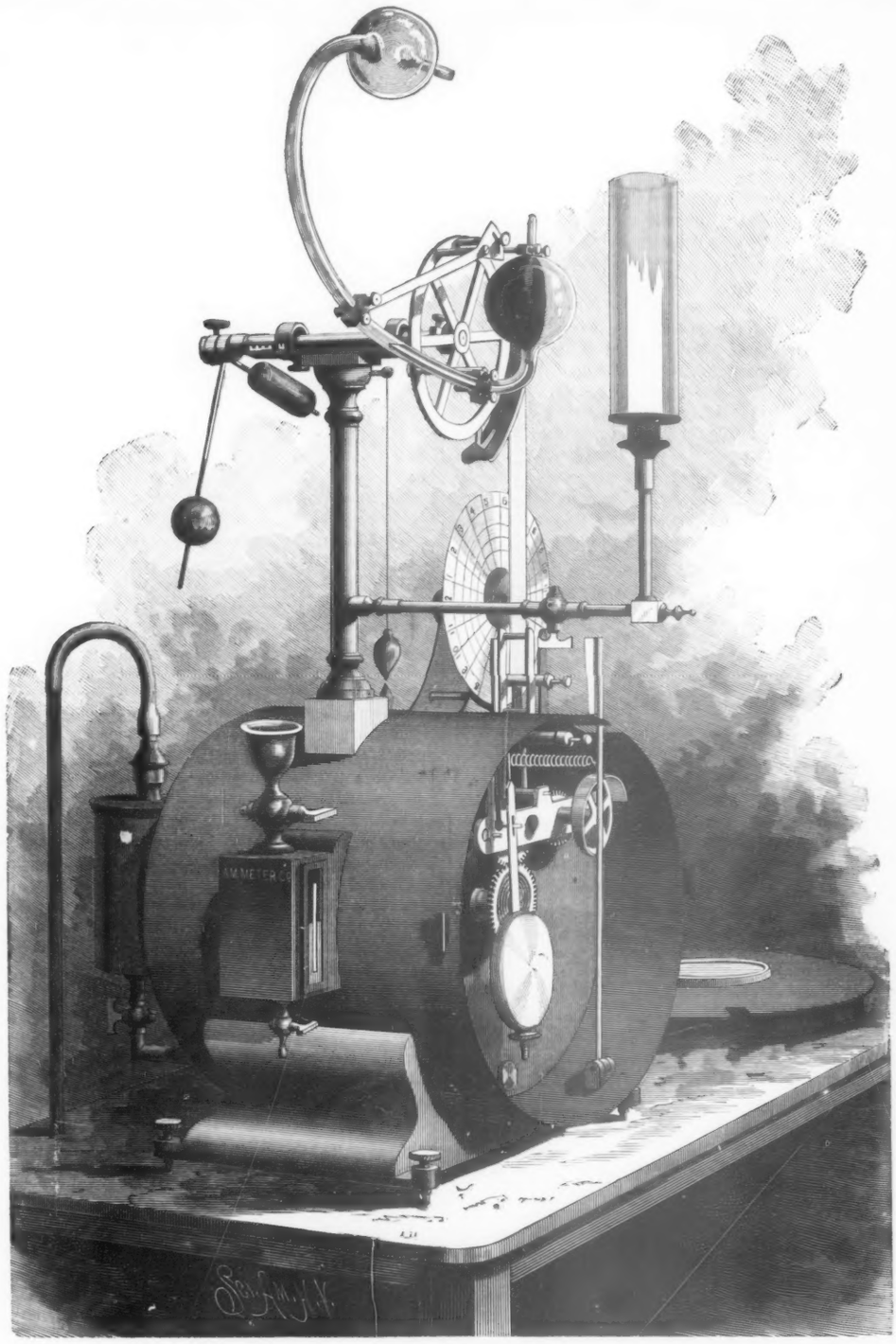
In conclusion we may state that we were very much impressed with and gratified at the working of the Washington system; and it was quite vigorously impressed on our mind that Mr. McIlhenny, in starting out "to see how to do it," had about accomplished his original purpose. It would seem as though he had not only discovered the correct principle and method of heating a bench, but had also been successful in attaining the desired end in a most economical manner.

It is Well to Know What You are Buying.

The latest sensations in gas and electric light circles are the incandescent gas lights of Otto Fahnehjelm and "Prof." T. S. C. Lowe. The former causes gas to impinge on a fragile magnesia comb; the latter applies water gas to a nameless metal of "his own" invention. The following is what the highest authority in the use of gases for heating and lighting (the distinguished Frederick Siemens, C.E., of London) said in an address delivered at Manchester, England, on June 9th, of this year:

"Flame destroys everything upon which it impinges—not by its heat, but by its mechanical action. Flame is a mixture of gases which are in a state of great agitation, the atoms moving with the rapidity of lightning; and as soon as this agitation is interrupted combustion ceases. Now, if a solid body were brought into such a flame the incessant action of the gaseous atoms destroyed it; and if it is continued everything becomes pulverized. This is clearly shown in the various efforts made to produce an incandescent light by means of gas. At one time water gas was much talked of as the agent; and it was considered by some to be the heating gas of the future. I do not share this view, because water gas has no power to radiate out light and heat. An attempt had been made to render it luminous by carburetting it; and also to use it for producing an incandescent light, by causing it to impinge on some solid material. In certain cases a good light had been obtained; but there was always a difficulty in maintaining the material. Lime answered very well at first, but it soon pulverized. Diamond was very hard, but would burn, whilst emery melted. Magnesia had been employed; and being a dense, hard body, which, the longer it was exposed to heat, contracted the more, it seemed the best for the purpose. But even it lasted only a week, or a fortnight at the most. For these reasons I do not think there is much chance of the ultimate success of incandescent lights."

Before gas managers or capitalists are induced to invest in these plausibly brilliant schemes, they will do well to consult the patent files of the United States, Great Britain, France and Germany. Within three years "Lewis' Platinum Incandescent," the most promising English invention, and "Clamond's Magnesia Incandescent," the much exploited French invention, have both proven failures. P.



THE THERMOPHOTE, OR SELF-REGISTERING PHOTOMETER.

For years past a photometer that would do its own work, like a registering pressure gauge, has been longed for by the gas engineer. As executed in the dark room the photometric test merely discloses the illuminating power of gas at a given period; no continuous watch is kept upon the quality of the gas. The instrument shown in the cut is designed to effect this. It is the "last thing out" in photometry. It registers in an entirely automatic manner the varying illuminating power of gas, for 24 hours, upon a disc of paper. The principles upon which it is based are simple and well established. The central one is the probable identity of radiant heat and light. A flame of constant consumption is secured by the use of a regulating meter. The shaft of the meter-drum is geared into an escapement with pendulum. This, by the back pressure it creates when the drum tends to revolve too fast, closes a valve through which all the gas admitted to the meter has to pass. If, on the other hand, the drum revolves too slowly, the same valve opens; and thus the drum is caused to rotate at a constant speed. The connections are so arranged that the level of water inside the drum is sensibly constant; so accurate is this arrangement that the meter is made to act the part of time-keeper in revolving the indicating card once every 24 hours. Its rate is independent of the specific gravity of the gas and of pressure.

The heat radiated from the flame is received on one of the bulbs of a differential thermometer. The thermometer contains a column of mercury that occupies the bend of the tube; as the gas increases in illuminating power it causes the air in the bulb to expand, pushing out the mercury. If the illuminating power diminishes the reverse action takes place. The thermometer is delicately balanced on knife edges directly behind the center of the heated bulb. As the mercury is pushed outward it carries down the

other bulb of the thermometer, imparting a motion of rotation to the system. By means of a suspended marking apparatus the positions thus assumed are marked on the indicating card. These positions correspond to candle powers.

As it is essential to avoid friction no pencil is used; but a needle is carried in its place, which is periodically struck by a hammer that is also worked by the meter. This causes the needle to perforate the paper at short intervals, thus indicating the candle power at the given instant.

This is the first practical registering photometer ever constructed. The first 24 hours' indicating card is carefully preserved by Dr. Sloane as representing the first mechanical registry of illuminating power of gas ever produced. One incidental feature of the apparatus is its extreme simplicity. All the attention it requires is that the water level be maintained, and that the card be renewed as required. There is no clock requiring to be wound. If the water level falls too low, nothing happens except that the gas is extinguished and automatically shut off, so that even in such a case of neglect only a few hours' record of candle power is lost. The attention it requires is less than what is bestowed upon a registering pressure gauge. Its accuracy has been exhaustively tested, and on coal gas is really remarkable. To increase this accuracy an alum or distilled water cell may be added, which may prove useful for water gas, though hardly needed even for such.

It is the invention of Dr. T. O'Conor Sloane, late Engineer of the Citizens' Gas Light Company, of Brooklyn, N. Y. It is manufactured by the American Meter Company. One of the instruments is now in this city, and it is well worthy of careful examination. It is destined to prove of great value to the profession as a solution of so long pending a problem.

[Official Report—Continued from page 7.]

Eighth Annual Meeting of the Western Gas Association.

Held at the Tremont House, Chicago, Ills., May 13, 14, and 15, 1885.

First Day—Afternoon Session.

Upon conclusion of discussion on Mr. Jenkins's paper the Chairman introduced Mr. V. L. Elbert, of Jackson, Mich., who read the following paper on the subject of—

stoppages in small gas works.

Mr. President and Gentlemen:—The subject upon which I write possesses one prominent quality or feature—and one not in manner conducive to the fostering of pious feelings—that of very often causing our gas superintendent to forget his prayers, and what is still worse, leading him to substitute therefor rather vigorous and emphatic language in the ventilation of his pent up wrath.

Gas works stoppages, like many another feature connected with the trade of the gas maker, are attributed, and no doubt rightly so, to a great variety of causes. Believing as I do that naphthaline is the most frequent, if not the prime source of stoppages in small gas works, it will be my object in this brief note to recount my experience with this great "choker-up;" and I might further qualify a portion of the above assertion by saying that *large* gas plants have good and sufficient reason to fear the naphthaline visitor. Not being familiar with the mysteries of chemistry, I am unable to go into the details or causes of naphthaline formation; but since the ill-smelling compound has every appearance of "coming to stay," it perhaps may not be long ere some professor of the subtle art will solve the complex problem for us.

Upon returning home from our last annual gathering (May, 1884) at St. Louis, Mo., and after having listened there to the recital of the "naphthaline woes" of some brother gas men, I congratulated myself heartily that my Jackson experience was not like unto that of others—although I should have known better than to indulge in such empty boastings, since a prior experience in Canada had made me intimately acquainted with the miseries of the naphthaline pest. I arrived home from the St. Louis convention about the 17th of May, and everything around the works was proceeding smoothly. This state of affairs kept right along until toward the last day or two of same month. At that time I was preparing to put a gang of pipe layers at work on street main extensions, when, almost without warning, the works were closed so tight that we could not pass a foot of gas to our holders. A hurried search revealed the seat of trouble to be located in the goose-neck over condensers. An application of steam removed the stoppage, and then I started the men (about thirty hands) at work on the street mains. Everything went along smoothly for the balance of that twenty-four hours; but at midnight I received a summons calling me down to the works, and there found that the trouble had reappeared. This time the stoppage was found in the 10-inch inlet to holder. This was bye-passed to outlet, and next morning steam was once more called to our aid, and the "way made clear." Since then we have had no particularly bad case of naphthaline stoppage at Jackson.

You will remember that previously I spoke about having had an experience with naphthaline deposit in a Canada works with which I had been connected as superintendent over a space of four years. That Canada plant had many features or points that resembled those of the Jackson works, and from this similarity I hope to establish a theory in regard to the subject in hand.

At the Canada works, during the first year of their operation, we had a regular "picnic" with naphthaline at least once every 30 days. Finally I noticed that the water supply connections to condensers were put together in such a manner that the gas was suddenly cooled and then allowed to heat up again. My theory is that such sudden changes will inevitably produce or cause naphthaline deposits.

The condenser connections were altered, and the deposit never appeared at that point again, but selected as its next stamping ground the vicinity of the center-seal. Here it would form above the water-line, and in bottom of seal, in cakes as hard as bricks. The overflow to center-seal was enlarged, enabling us to keep the seal tolerably clean; but still stoppages would occur at that place two or three times in the twelvemonth. This bothersome condition of affairs, I am told, prevails there to this day.

Now, here are two works built on nearly the same principles, designed by the same constructing engineer, and erected by the same builders—the one has but slight trouble, while the other is constantly affected, from naphthaline deposit. Why should it be so? In the endeavor to account for it I shall attempt a partial description of the machinery of each works.

Following the hydraulic main of both plants comes a steam-jet exhauster; then two tar scrubbers, composed of two vertical cylinders filled with perforated plates about three inches apart; then two condensers, consisting of two vertical cylinders fitted with boiler tubes, and arranged for thorough water circulation. All four of these cylinders are on one box base. In the Canada works from that point the gas passes into a scrubber, then underground to purifying house, some 20 feet away, then through lime purifiers.

In the Jackson works, instead of using water in condensers, after the gas passes the cylinder condenser it passes through some 300 feet of atmospheric condensers, then into scrubber, on to iron sponge purifiers, and finally reaches holder. All the apparatus—excepting, of course, the holder—are under one roof; and the gas in its passage is not required to make any underground travel. Bearing this arrangement of machinery in mind, we now come to the gas manufacturing details, which are not identical at both works.

At Canada we used Youghiogheny nut coal, without enricher of any kind. This coal came to us by boat, was dumped into wagons at unloading wharf, was hauled a mile over rough roads, and finally was shoveled into coal shed. By the time it was housed it was in a pretty fine state of division. Placing this material into a retort at bright orange heat, the resultant gas passed through a steam-jet exhauster, tar scrubbers, condensers, washer, and, by underground conduit, to purifying house—all the travel being accomplished over a route of only 40 feet—naphthaline naturally formed in the coolish and damp center-seal, and was taken therefrom, as before mentioned, in the shape of cakes about as hard as bricks. If the deposit was formed in the condensers, it then resembled fish scales.

At the Jackson works we carbonize the best quality of lump coal—size that will result from screening over 1¼-inch mesh—adding about 10 per cent. of cannel; do not work under as high a heat as the orange-red; pass the gas through a steam-jet, but cool the product gradually; have used both iron sponge and lime in purification; and, except the May incident of a year ago, have never had any naphthaline bother that could really be classed as serious. Indeed, that May experience of mine with the great "rock candy" pest happened under the following circumstances.

We had had ten carloads of a certain coal sent us for trial. Instead of the shippers forwarding us the material that we ordered they sent us a rather poor quality of steam coal. Not only was it poor in quality, but it was also full of dirt; and to make matters worse we had just run out of cannel. The "dirty" steam coal was heard from in the shape of the May stoppages. We dropped the use of the steam coal for a space; then tried it again, with the result that we would "have no more of it," and rested content in the carbonization of the sort formerly used.

Putting everything together, I am satisfied that one cause—and a leading one—of naphthaline stoppages or deposits is too sudden cooling of the gas; and that "stoppages in our small gas works" may be charged to naphthaline and a too free use of "lean" coal.

Many theories have been advanced as to wet coal, dry coal, and wet and dry coal. Our coal shed sends out the former in rainy seasons, the latter in dry periods; we have used lime and iron in purification; have fed large and small doses of water to our scrubbers; the works went on well enough at all seasons, unless it so happened that we were working on a poor quality of coal.

Allow me to thank you, gentlemen, for your kind attention to this, my "maiden speech."

Discussion.

The President—I was not aware that our smaller works were having so much trouble with naphthaline. In my experience, when using Western coals, I did not know what it was. Naphthaline was a stranger to me until I began to carbonize Youghiogheny coals.

Mr. J. B. Howard—What is the name of that "dirty" steam coal that Mr. Elbert complained of?

Mr. Elbert—It was sold as "Newton's Westmoreland;" but I do not believe it was that sort of coal.

Mr. Howard—I will state that when using Brier Hill coal I did not know what naphthaline was.

Mr. J. R. Thomas—The naphthaline question appears to have become a permanent one. I suppose no other topic or feature connected with gas manufacture has received a similar amount of investigation. In the works that I formerly managed we were frequently troubled with naphthaline; invariably I found that by increasing our cannel we got rid of the pest. Its eccentricity is well known; when we did not have a sign of it in the works we would have it in our street mains. On the services to one particular stretch of pipe we had a lot of bother; at last we traced the cause to the fact that the formations occurred at the foot of a street occupied as a street railway terminus, where the pavement was kept continually wetted. We could not prevent them from wetting the pavement; but by increasing the size of the services we got over the difficulty to a great extent. In some places, and particularly in the East, where they have been greatly troubled with naphthaline, they had their hydraulic mains placed very close to the benches; and it was supposed that this style of construction had much to do with the deposit. In other cases that I have known of the dip-pipe has gone almost down to the bottom of the hydraulic main; increasing the depth of main has given great relief. My experience has been that naphthaline forms in greater abundance with a steam-jet than with a rotary exhauster; and I might add that such is the universal experience—always, of course, excepting Brother Howard's trials. The eccentricity of naphthaline appearance is its greatest peculiarity. Just previous to the time of my leaving the Williamsburgh works we had more trouble in our valve house than in any other place, and not a trace of the deposit showed in the purifiers. We have had occasions where out of three services the center one would be free and clear, while those to its right and left were solidly plugged up. Indeed, this matter of naphthaline formation appears to be "one of those things that no fellow can find out." An increase of one or two per cent. in the quantity of cannel coal that we were using would invariably free us from the pest.

Mr. R. Spencer—Speaking in reference to the use of Western coals in small gas works, I would like to inquire if any of the gentlemen here, who have exclusively used the coals of Illinois and Iowa, have ever been troubled with naphthaline? I have had a similar experience to that recounted by the President when he spoke of using Western coals; and I may say that I never saw anything like naphthaline when using such coals. The general idea seems to be (and because they are poor coals) that by using a certain percentage of cannel with the lean coal the likelihood of naphthaline formation is, to a certain extent, done away with. How can you reconcile the idea that with a very poor coal and cannel enricher you do not get naphthaline, as against the assertion that in the use of a rich Youghiogheny coal without cannel you do get naphthaline?

The President—It is one of the vagaries of experience.

Mr. Howard—In answer to Mr. Spencer's question I will state that for over ten years I have used nothing else but Illinois coals, and never knew what naphthaline was—never even saw it. I also used Youghiogheny coal and never had naphthaline. Then I have used ten per cent. of a cannel enricher and did have naphthaline.

Mr. W. H. Odiorne—In Springfield, Ills., we used oxide of iron for purification, and had a steam-jet exhauster; yet we never knew what naphthaline was then. Next we carbonized Pittsburgh coal to the entire exclusion of the native coal, and our naphthaline experience commenced. We then tried a mixture of Illinois and Pittsburgh coals, (using, say, 6 per cent. of the former), and the naphthaline formations disappeared. During the summer season we use no cannel whatever, and are not troubled with naphthaline.

The President—I am glad that this phase of the question has come up. A few days ago I suggested that the experiment of mixing Youghiogheny and native coals be tried for the very purpose of determining that which Mr. Odiorne has affirmed.

Mr. Odiorne—I further find that the exclusive use of Pittsburgh coal causes the stand-pipes to stop up. With native coal these stoppages are of rare occurrence.

Mr. W. H. Levings—Our works at Paris, Ills., are quite small, and during the first year of their operation the only stoppages experienced were in the stand-pipes. The second year we used Youghiogheny coal exclusively, and then had naphthaline. In the first quarter of the following year we used Western Indiana coal, and did not have naphthaline. We are now using about half Youghiogheny and half Indiana coals, with a small percentage of cannel, and naphthaline has not yet been developed.

Mr. Elbert—We have plenty of native coal almost at our doors, but we cannot use a pound of it; it would stop our works right up.

The President—Is that coal too rich?

Mr. Elbert—It possesses great richness in something or another; and what that something is I cannot tell. I do know, though, that we cannot use it.

Mr. E. H. Jenkins—It may be that in time, through an examination of the properties of the different coals, we may be better posted in regard to naphthaline formation and deposit than is the case now. I will say that at Columbus, Ga., we are using the Alabama coal, and its grade is quite similar to the native Western coals spoken of. It is a light grade of coal; but we do get plenty of naphthaline from it. I have taken three or four bushels of the pest out of one purifier; but still I think, on the other hand, that our naphthaline deposits are not altogether traceable to the coal, since I must admit that the construction of our works is such as to qualify them as a first-class naphthaline producer. My query is whether a careful analytical test of the different sorts of coals will enable us to find out what is the peculiar property of the coal that gives birth to naphthaline.

The President—During the last 20 years I have tested 75 samples of Illinois coal in the way of practical gas making, and naphthaline never made its appearance with them. I know that different works are constructed so that the circumstances vary as to manner of condensation—and this latter I think goes a long way towards forming naphthaline; but taking the ordinary small works—one operating, say, two benches—the condensing area is sufficiently large to admit of working along all right until that period in their capacity is reached where the plant has to be "driven" to supply the demand for gas. I have known of engineers making the claim that they never had naphthaline until they got to sending out twice as much gas as the plant was calculated for, or when the works were first started. I think the naphthaline difficulty is a matter of individual experience with each one, dependent upon different coals and different surroundings. This is a real good "experience meeting;" and we would like to hear from several more whom I know are using mixed coals. These are the footprints (spoken of by me this morning) that we may leave; and although there are some here who may not be inclined to talk, yet they willingly pick up these items. Now, I hope that all will express themselves freely on this subject.

Mr. J. W. Dunbar—When using a steam-jet at our New Albany (Ind.) works we were troubled with naphthaline. I once heard Mr. Somerville make a remark that I think cured the naphthaline scourge with us. It was something similar to this: He said, "Deal with gas gently, and very likely you will not have naphthaline; but deal with it *not* gently, and you are sure to have it." Prior to hearing this the gas at our works was not dealt with very gently, and so we had naphthaline; but Mr. S.'s admonition set me at work on the matter. I increased the size of our hydraulic main, and instead of running the gas through the scrubber I changed the plan so as to run through the condenser and then through the scrubber. We are now working at higher heats than ever before; but are not troubled a particle from the pest. Under the old style, out of a total of 450 consumers, we would have a dozen complaints per diem about the service pipes. Now we do not hear any of this. I think that the trouble or cause of naphthaline, more than anything else, is dealing with gas harshly. Give your gas sufficient time to cool off gradually.

Mr. John Fullagar—For the last twelve years I have heard of many cures for naphthaline. Everybody has a cure. Mr. Patterson, of London, in 1873, stated that slow condensation caused stoppages, and tried an expensive system of gradual cooling off through long lines of large conducting pipe. We never had any trouble with naphthaline, except at the holders; and we know now almost the very day that it will make its appearance. We may look for it about the 3d of November, and may expect it to remain for 15 days. Then again it will appear about the 10th day of March, when we will have, perhaps, a ten days visit; and I submit that that upsets your slow condensation theory. On one occasion we had only four benches running at our new station, while the total capacity of the plant is four millions cubic feet per 24 hours. The superintendent reported to me one day that he had a stoppage. I said it was impossible to have a stoppage while running at such a low figure; but investigation proved that the multiple condenser was completely stopped up. The gas was almost at the freezing point, and there was an evidence of the beauty of slow condensation, or rather it would show that it did not count for much as a preventer of naphthaline. Some of the brightest chemists both of England and this country have been puzzling over the matter for twelve years and have not yet found a remedy. Some of our members here will remember that, up to 1872, we never knew what naphthaline was; it never troubled us then for the simple reason that we were satisfied with a yield of 9,000 feet per ton of coal. When we carried the make up to ten and twelve thousand the trouble commenced. You will find, from the English reports, that before the government made com-

pulsory the practice of close purification English gas engineers did not know what naphthaline was. When the sulphur and ammonia restrictions were enacted the naphthaline pest showed itself. The cause of it all is, according to my view, close purification, and making too much gas from a pound of coal.

Mr. James Somerville—This subject of naphthaline is like Banquo's ghost—"it will not down," but is ever ready to shake its "gory" (or hoary) locks at us. I thought our friend Howard had put a quietus to it; but from the testimony brought out here it would seem that it is livelier than ever. The remark of friend Fullagar that with a production of 9,000 feet per ton of coal we would not have naphthaline, does not necessarily follow, and because over-production of gas is exactly the same as high heats. There are three things responsible for naphthaline production. First, poor coal; second, high heats; third, over-condensation. You can produce naphthaline under any one of those three heads, and I will ask the members which of them it is that they are doing. Our friend Jenkins may attribute his trouble to over-condensation. Six years ago, on taking charge of the Indianapolis works, this item of naphthaline was not only a cause of great expense to the company, but also of vexation to its consumers. I would not put up with that state of affairs, and I determined that the gas was not properly washed. I took the washing business into my own hands, and had a set of cocks arranged so that I could manipulate it to the point of allowing only a sufficiency of water to make contact with the gas. From that time to this I have not seen a trace of naphthaline about the works. This is an "experience" meeting, and what I have said has been my experience. I hope it may help some of you.

THE QUESTION-BOX.

Mr. J. B. Howard here assumed the chair, and said that, as the lateness of the hour would preclude the reading of another paper, he would open the question-box, so that one or two of the contained questions might be answered before adjournment. This was agreed to, and the first question was found to be—

"*Is there anyone present who can say anything about the Lowe incandescent gas burner?*"

Mr. Walton Clark—I received this morning a letter from a gas engineer on that very subject, in which the writer said, "I had no chance to make any investigation; I can only say it made an excellent show, and lit up the room beautifully." I had heard from this correspondent once before in reference to it. He said that the light was a beautiful one, but that he had had no means of finding out the cost of same, the durability of the burner, or the amount of gas that was being consumed in the production of the illumination.

The President—If the gentleman will allow me I will give some information received by me since my arrival in Chicago. A Mr. Loomis, who is connected with the Lowe organization, and is operating the Lowe Gas, Fuel and Heating Company, at Lynn, Mass., was in the city yesterday, and said he wanted to give me some information with regard to Lowe gas. At Dubuque, Iowa, we have the apparatus of a steam heating company, and his idea was to do away with that apparatus, substituting therefor the Lowe gas system in the attempt to furnish heat as well as light. He informed me that they had got the process in good working order, and that they could use a poor quality of bituminous coal instead of anthracite, and obtain therefrom 75,000 cubic feet of gas per ton. I asked him a question in regard to the durability of the incandescent burners. He replied that he could not exactly tell me what material was employed in their construction; but assured me that it was indestructible. He did say it was not platinum. He also stated some of the burners would give a light equal to 2,000 candle power—in fact, there was no limit to their illuminating value. I next asked him the question whether they had adjusted the burners to a lighting value of 5, 10, or 15-candle power. His reply was in the affirmative. He averred that was one of the things that had been successfully worked up. He said Mr. Lowe had been using burners varying from 5 to 20-candle power over an experimental period of four months, and that their power was not seemingly diminished at the end of that time. I mention this for what it is worth; for of my own knowledge I cannot speak.

The hour for adjournment having arrived, a recess was taken with the understanding that the Convention would reassemble at eight P.M.

FIRST DAY—EVENING SESSION.

At eight P.M. Chairman Lansden called the members to order, and said—This evening, if agreeable, we will have an experience meeting, and I think we had better keep on with a consideration of contents of question-box. The second question is—

"*What is the yield of gas per retort, with tar as fuel as compared with coke, during the life of said retort?*"

Here is a practical question for those of you who have had experience in the burning of tar, as compared with the burning of coke, under your retorts.

Mr. E. J. King—I am considerably interested in that matter, and it is one that I want information in regard to. At one time I asked Mr. Fullagar about tar burners, and his reply was, "I can only answer that by asking whether you take the amount of gas that the retort yields when under coke or tar fires. A retort will make more gas with tar, because of the higher heat; but then it will not last as long as when fired with coke." I would like to hear the question freely discussed.

Mr. E. McMillin—As this is to be an experience meeting, I am, perhaps, out of order. I doubt very much if you get as great a gas production, in the lifetime of a retort, when firing with tar as fuel compared with coke. If you could run at uniformly high heats with tar fuel, provided also that the retort would stand for a twelvemonth, then possibly you might equal the yield secured under a 15 months' run with coke. It is a most difficult thing to secure a steady feed of tar to the fire. At one time the feed is too great; at another period it is too small. The great draft incurred through the large openings that allow the air to pass in around the tar burner in such excessive quantities is destructive to outer shell of retort—the cold air strikes its surface, and cools it off in the contact at one moment, while almost immediately the retort is again at a high heat. That constant changing of temperature would cause the burning out of a retort before it could be made to produce as many feet of gas as would be obtained with a coke fire. I have burned tar for a good many years, and up to the time we put in our regenerator furnaces I thought it paid to follow the practice. On the whole, if I were not using the improved furnaces I would still burn our tar; and for the reason that tar with us is probably worth $1.50 per barrel, while we can get ten cents per bushel for our coke.

The President—Do you think $1.50 per barrel for tar, and ten cents per bushel for coke, is the proper comparison to make in estimating the fuel value?

Mr. McMillin—I am only speaking from memory; but I think that was the basis on which I figured it.

Prof. S. H. Douglas—During the last four or five years I have burned up about all the tar that was produced in the works. We do not get enough in quantity to fire a bench continually, and from that intermittent sort of working I could not offer a positive answer to the question proposed. I may say that I find no difficulty in keeping up a perfectly uniform and very intense heat; but, however, I do not allow any considerable passage or entrance of atmospheric air into the bench. When using tar I bank the ashpan in front of the furnace in the attempt to preclude the too free admittance of air. I cannot say that a tar fire is more destructive to a retort than one generated from coke—provided, of course, that due care is exercised. Tar produces an intense heat; and if the man in charge of the burner permits too free a feed, then the retorts will suffer. I have inquired into the subject of the money value of tar fuel with some exactness. Formerly we sold our tar at such price as we could get, and latterly all gas men have learned that the tar market is a very doubtful quantity. The small lot that we now dispose of is sold at $5 per barrel. I calculate that, with coke at 12½ cents per bushel, a barrel of the tar has a fuel value equal to $4 worth of the coke. We experience no difficulty in disposing of our coke; but we did have considerable difficulty in disposing of our tar. Now we burn all the tar that we cannot sell at the rate of $5 per barrel. Tar makes a very excellent fire, and my experience goes to show that the fire is an even one. Certainly it requires experience and care in operating, and an inexperienced man might allow the retorts to be materially damaged through failure in the observance of common-sense precaution. There is one thing that we do escape in running tar fires—the walls of the fire pit are not injured by clinkering; and while you may lose a trifle in the life of a retort, on the other hand, you gain in decreased wear and tear of firebrick. After our first year of burning tar I made an estimate as to what gain had accrued, and I found that, under a single bench, we had made a net profit of about $500. That is, we sold $500 worth more of coke and tar than we did in the corresponding months of the previous year, or when we were using coke exclusively. As near as I can give it that has been my experience in the use of tar.

Mr. J. M. Starr—Do you have grate bars?

Prof. Douglas—Yes; we put ash and breeze on top of the bars; then close up the front with ashes under the grate bars so as to exclude the air. We place on top of the breeze a little of the ash that comes from the adjoining retorts, simply to keep a mass of compact material for containing the tar. I consider it a very important point to close out the current of atmospheric air. The opening through which the tar is burned is about four inches square. Of course it is burned in connection with steam.

A Member—About what is the life of a retort?

Prof. Douglas—I answered that question when I said that, inasmuch as we do not burn tar constantly under any bench, I could not state precisely. Possibly the life of the retort may be shortened; but of that I am not altogether certain when the contingency of careful operating is remembered. On one occasion the man in charge allowed a too great tar feed, and the re-

sult was an injury occurred to upper retort from overheating. What I have detailed has been the result of five years' experience.

A Member—How long do your retorts last?

Prof. Douglas—From 3 to 3½ years.

A Member—What quantity of tar do you use in 24 hours?

Prof. Douglas—About 100 gallons to a bench of threes. I thought that, as long as we could sell coke at 12½ cents per bushel, and could get something less than $5 per barrel for the tar, we had better burn the latter.

The President—I am afraid some of the tar men will inquire into the cost of freight up your way in the attempt to ship you some from the smaller works in this section of the country. Tar has been a drug in a great many of our markets.

Prof. Douglas—We make it net us $5; when we cannot get that we burn it.

Mr. James Somerville—Suppose you wanted to sell it all; could you then get $5?

Prof. Douglas—No; under those circumstances we might get $1.75 per barrel.

Mr. Jenkins—Do you estimate that a barrel of tar is equal to 40 bushels of coke?

Prof. Douglas—Yes, sir; about that.

Mr. Jenkins—I have had some experience in the use of tar as fuel, and the figure as to relative value I finally decided upon was that one barrel of tar equaled 20 bushels of coke. I thereupon made as a rule that where tar was worth $2 per barrel, and coke was worth less than 10 cents per bushel, it would be better to burn the coke and sell the tar. When tar was worth $2 per barrel, and coke could be sold for ten cents per bushel, I thought it better to reverse the proceeding.

Prof. Douglas—My impression is that we used more than 20 bushels of coke per bench—I should put our figure at between 30 and 40 bushels.

Mr. Jenkins—We have had no trouble in the heating of our furnaces with tar. I do not consider there is any more wear and tear on a bench when using tar than when using coke. In the very matter of clinkering alone—with tar quite a saving in the lifetime of the bench is effected.

Mr. J. B. Howard—I have burned a good deal of tar; and my experience goes to show that the best time to use it is toward the last year of the duration or lifetime of the bench. When the furnace is enlarged through wearing away, I find that the yield of gas is increased by operating tar fires. I can get stronger heats with tar. I follow the same method as that pursued by Prof. Douglas. I close up the ashpan; but I allow a larger opening for the air space than he does—about six inches square. I do not use as much tar as he does. I think my maximum limit is about 80 gallons, with about 5 bushels of coke or breeze, per day. I find no difficulty in keeping up a steady heat. At one time I had difficulty in keeping the tar flowing all the time. It was in the winter season, and the cold air rushing through when doors were opened would affect the supply pipe to such an extent that the tar would chill and its flow would cease. I remedied that by running a steampipe on tar pipe leading to burner; and whenever, through chilling, the flow became deficient, turning on steam would immediately reduce the tar to the proper consistency. To me there is no question that you can get up a great deal stronger heat with tar than with coke. I never fire up a new bench with tar heat, since I do not believe that the duration of a retort would be as great were it initially fired with tar instead of coke.

Prof. Douglas—Perhaps I ought to state one fact in connection with the use of tar as fuel, and perhaps it may also have occurred to others. The tar from condensers is worthless (or nearly so) as a fuel. We use only that which is taken direct from the hydraulic main.

Mr. Howard—That is my case.

Mr. Starr—It is said that "one man's meat is another man's poison." I have been burning tar for about 12 years, and instead of closing the front of the furnace, and thus excluding the air, I leave it open. I do not use any breeze on the grate bars, but drop the tar right down to the bottom. When I tried the breeze plan I could always notice flame and smoke issuing from chimney top; but the very moment I tried the other system the chimney gave no more evidence of that great waste. In fact, I may say that if I had a regenerator furnace the chimney could not show to better advantage. I use from 75 to 80 gallons, and get splendid heats. I think you need plenty of air supply for the proper combustion of tar fuel. Now, as to the lifetime of the retort: I had two benches built with the idea of using tar as the fuel to heat them with, and did so because, owing to their situation, I could not put in regenerator furnaces. These benches last as long as the coke-heated ones. I got the idea from Mr. Light, of Dayton, Ohio, who has met with great success in the employment of tar fuel. I keep the tar limpid in this way. I put in a two-inch pipe, and through that run an inch pipe—steam is fed to the larger pipe, and the tar flows through the smaller one. Of course, that plan keeps the tar in a fluid state. The opening that Mr. Light burns his tar through is not larger than the sixteenth of an inch—perhaps even less than that. Perhaps I may not have been successful in that direction because my tar is not clean enough.

A Member—Perhaps Mr. Light uses a strainer.

Mr. Starr—I use a strainer, but still have trouble. Mr. Light uses no breeze. Our tar benches last for three, and even four, years.

The President—Do you inject it in with steam?

Mr. Starr—Yes; with a Watertown blower.

Prof. Douglas—The principle followed by you in burning tar is very different from ours. We depend upon the decomposition of steam to furnish oxygen for the combustion of the tar—closing out the atmospheric air.

Mr. Starr—You use a steam blower?

Prof. Douglas—Yes. The tar is carried out of opening inside a ring-jet of steam, and passes into the bench as spray. An intensely white flame fills the bench.

Mr. Starr—Do you have flame coming out of chimney top?

Prof. Douglas—Yes; at night the chimney might emit a flame two feet in height. It depends somewhat upon the manipulation of the valve. If the man in charge is careless the chimney top will show it.

Mr. Harry E. Clarke—We used tar in heating benches at Kansas City, Mo., a few years ago, but used it rather differently to that here spoken of. We injected it with steam—atomizing it. We carried it down through an inch pipe from under the stack to the bench, injecting it with what is known as the Carroll injector. The heats were always quite uniform. I do not see any reason for supposing that the life of a retort will be shortened from using tar as fuel. The care of the jet was left to the foreman of the retort house; and it was but rarely you could perceive smoke issuing from the chimney. I closed up the ashpit, and employed neither dust nor breeze. Air was admitted from front of bench through an aperture fitted with a damper, so that the air supply could be regulated at will. I am now burning the tar from oil gas (injecting it under the boiler) with great success. This tar is considerably lighter than coal tar.

Mr. G. A. Hyde, Jr.—I have had some experience in tar burning, and my trouble has been that after a few months' of running the supply source clogs up. I have tried various sorts of valves; have heated the tar; have injected it under pressure; and have blown it in in every way; but the valves will stop. If there is any way of preventing this bother I would like to know of it.

Mr. Howard—I use a tar burner as an injector. It is made out of 1¼-inch pipe through which the steam passes. There is no trouble in keeping the supply steady provided you use a proper cock instead of a valve. By using a cock with an oblong opening the supply cannot be regulated as well as can be done with one having a round hole. The cock (it is the ordinary steam engine cylinder cock) that supplies our tar burner is right close to the burner itself, and has a quarter-inch opening. There is no trouble in regulating it.

Mr. Hyde, Jr.—I did not try the cock arrangement; but I did use a quarter-inch valve, and was not successful. I afterwards tried a small throttle valve, but that would also clog up.

Prof. Douglas—I use a slide-valve with knife edges so as to get rid of all friction. With such a valve I have no difficulty in regulating the tar flow.

Mr. J. H. Woodmansee—I have had some experience in tar burning at the Danville (Ills.) works, and the main trouble I had was in the matter of getting a proper supply. At last I threw away all valve work with small openings, and put in an ordinary three-quarter street cock. My retort house foreman now regulates it, and seems to have no trouble at all. It turns easily. The tar will clog occasionally; but that, I think, is on account of dirt that may have fallen into the tank or lodged in the cock, and is easily remedied. I had no trouble in burning it out. I like the action of tar fuel very much.

The President—For about two years I burned tar under 16 benches, and had the same trouble. I took an ordinary cock and drilled an inch round hole in it; then I got eight-inch diameter (or the ordinary small mesh domestic flour) sieves, and hung them as strainers over the tank where the siphon from the hydraulic main entered. The sieves required cleaning about once a week. Tar was worth 35 cents per barrel when I commenced burning it; afterwards we were offered $1.50 per barrel for it, and then we went back to coke.

The President—The next question is—

"*If your town were piped with cast iron mains, laid in cement, what would you do to prevent breaks in them in winter time?*"

A Member—There is nothing you could do.

Mr. Starr—I would take it up and lay it with lead.

Mr. Hyde—Suppose the pipes broke with leaden joints; what would you do then?

Mr. Starr—I should lay them properly. If you put pipe down in gravel, or in soft, spongy soil, a foundation should be put in. I once laid pipe right through a swamp, and was obliged to put a bridge foundation under each

length, filling it in with gravel and cement on the side. It has not settled in the least. It is covered with water to a distance of a quarter mile of its length, and there has been neither condensation nor leakage. Plenty of pipe work is done in this manner. The trench is dug six inches deeper than necessary, and then a quantity of dirt to make the coffin pit is thrown in. Miles of pipe have been laid in that way. Dig the ditch to the proper depth and then bring it to a level. I have hauled many a load of gravel, put it alongside of the pipe and tamped it under, so that the bearing shall be even all along its line.

Mr. Hyde, Sr.—I submit that the question does not refer to improperly laid foundation, but rather to the remedying of contraction.

Mr. Starr—I do not allude to drawing out. I think that pipes seldom break from contraction; these breaks are the result of foundations giving way. I had pipe broken last year that was laid over a tract where the ground was soft. I think sufficient allowance should be made for the contraction of each joint. The groove in front of the bell takes the length there, and it will not pull out. Before that groove was placed in the mouth of the bell the lead would pull out. The groove prevents this, for if the pipe contracts it will draw up on the portion that is behind it. I think the breaking of pipe is the result of poor foundations.

Mr. Jenkins—If your pipe were laid at a depth of but three feet, and the frost went down below that, would it not pull apart? This last winter I received two letters from Cedar Rapids, Iowa, stating that two breaks had occurred on the mains there. At that place I know, as a rule, frost sinks some 18 inches below their mains. The breaks spoken of were on Main street, and that pipe had been down a long while. I am confident that the Cedar Rapids fractures were the result of simple pulling apart.

Mr. Starr—Of course, fractures may occur from that cause; but I have never yet had any such trouble. I have recently put down pipe at a depth of 3½ feet.

Mr. Hyde, Jr.—I would put pipe down out of way of frost, even if I had to bury it 10 feet.

The President—This question has probably been asked by some superintendent who has charge of a works the main system of which was originally laid with cement joints. There are quite a number of such cases in the Western country.

Mr. Somerville—I would suggest that expansion joints be put in—provided the old cement joints are sound and good.

Mr. Starr—What distance apart would you place these joints?

Mr. Somerville—That would be a question of situation.

Mr. Woodmansee—An expansion joint would take up the expansion of what length of main? How far apart should they be located?

Mr. Somerville—I would say about one to each quarter of a mile.

A Member—About four years ago we laid some pipe, and tried both lead and cement joints. Two years ago we put in pipes with all lead joints. The past winter frost penetrated very deep, and we had much trouble from main leakage; and it was particularly bad on the mains laid in all lead joints. The pipe has the groove spoken of by Mr. Starr; but notwithstanding all that the lead was pulled half an inch out of the bell. The pipe laid in cement joints was perfectly sound. Such is my experience. The pipe was laid beneath a covering of four feet, and the frosts of the past winter went to a depth of five feet.

Mr. Odiorne—At Springfield, Ills., we have about 20 miles of main—12 of it being in cement and the balance in lead. All the old pipe was originally laid in lead; but for the last 15 years the practice has been to use cement. We find that more breakages occur on the lines laid in lead than on those laid in cement.

A member—Are they laid at about the same depth?

Mr. Odiorne—We try to place the pipe out of the way of frost, or at a depth of about three feet. That is our rule.

Mr. McMillin—To me it seems possible to prevent the breaking of pipes laid in cement, provided they are laid where frost will not reach them. Pipes are usually put down in the warm season, and are often laid in the trenches when the temperature is at 70° to 90°, and covered over with earth. By midnight they are already beginning to leak, because of pulling out or shortening up. I do not see that the expansion joint suggested by Mr. Somerville would answer, unless there was one between every cross pipe. If you had cross pipes every 300 feet, and the expansion joints were a fourth of a mile away, the case would not be met. The cross pipes would prevent carrying off the expansion to the expansion joint. On ten, fifteen, or twenty miles of main, if one will stop to think of the difference between the temperatures he will find that several feet of main must find a place somewhere; and as the cement joints will not give the pipe must go. The argument used that the joints were pulled out seems to me to be a good one.

Mr. Odiorne—Five years ago this summer we laid three miles of 6-inch mains, and reinforced our small mains extending out in all directions from the city. On that three miles of main we have not had a single breakage.

Mr. McMillin—You were below frost?

Mr. Odiorne—Yes, I think so.

Mr. Starr—In placing pipes I put them in the trenches, but do not cover them up in the heat of the day. At nightfall I test them, and early next morning replace the soil. I try to have them cooled out before they are covered.

Mr. L. K. Scofield—This matter of pipe laying is of interest to me. I had been out of the gas business for several years, but finally drifting back to it, I had occasion last year to put down a goodly length of mains, in sizes of 6 and 8 inch. The pipe was carefully laid, and the packing of each joint was cautiously watched. When the work was finished my foreman "guessed we had one section of pipe that would not leak." After 1½ months had passed we had a rather suspicious rise in our output, and the meters failed to record that our consumers were responsible for the increase. We quickly ascertained that our gas was passing out through almost every joint of the newly laid pipe. We had put in pipe that was heavily coated with oil and pitch; this coating had dissolved, and the joints leaked like sieves.

The President—What quantity of lead did you use in proportion to the packing?

Mr. Scofield—I cannot tell that; but we were not at all chary of it.

A Member—Did the coating extend to the bell and spigot?

Mr. Scofield—Yes.

Mr. Hyde, Sr.—We had some experience of that kind, and at the Washington meeting of the American Association I presented a paper on that very subject, in which I called the attention of the fraternity to what I regarded as very important information. This is a matter which every gas man ought to know of. Never put down a piece of pipe that has a speck of tar in the spigot end.

Mr. Scofield—It was through reading Mr. Hyde's paper that my superintendent concluded our difficulty arose from a similar circumstance. I would like to ask Mr. Hyde if this pipe can be releaded and made tight?

Mr. Hyde, Sr.—I do not know as to that.

The President—I would like to ask Mr. Hyde upon what he places his dependence for the making of a tight joint—the packing or the lead?

Mr. Hyde, Sr.—We drive the packing up tight, and afterward drive the lead home. I suppose that a joint can be made almost tight with packing alone; but I would not care to trust it.

Mr. Spencer—I have no suggestion to make to Mr. Scofield in regard to repairs; but as a future practice I would suggest that he try cement.

Mr. Baxter—About two years ago I put some cement joints in a 4-inch pipe. It was late in the fall, and, frost and snow coming early that season, we finished up the balance of the main in lead joints. Next spring we had considerable leakage. In our examination we found that the majority of the lead joints were leaking; on the other hand the cement joints were perfectly tight. I use the Rosendale cement.

Mr. Somerville—How did you make the cement joints?

Mr. Baxter—I drove in packing, filled in with cement flush to the bell, tested the joints, and then put a slight packing around the outside of the bell. I have done that for thirteen or fourteen years.

Mr. Spencer—In reply to the argument between our President and Mr. Hyde, I think the soundness of a joint, whether of cement or lead, depends pretty much upon the style of packing pursued. I know of one strange instance that happened on a line of small pipe in our town. We were overhauling pipe that had been in the ground some six or seven years, and found in one case that a slight escape of gas followed the insertion of the probe. In digging we uncovered a joint that was bare of either lead or cement. There was nothing in it but ordinary packing yarn; and the leak was so slight that a match would not cause it to burn. It would flash a trifle.

Mr. H. T. Gerould—At Mendota, Ills., we put in some of that tarred pipe, using cement joints, and our leakage was excessive.

Mr. Hyde—The joints were made of cement?

Mr. Gerould—Yes, sir.

The President—Are your pipes out of the reach of the frosts of winter?

Mr. Gerould—No; frost with us goes down from 5 to 7 feet, and the pipe is laid at a depth of 3½ feet.

A Member—How do you make your joints?

Mr. Gerould—We make them of cement, and use jute packing.

A Member—What proportion of sand do you use in the cement?

Mr. Gerould—None; we use pure cement. We put in a good jute packing, solidly driven up, then add a second packing, and afterward put on the bell.

Mr. Spencer—At Burlington, Iowa, we favor the cement joint, and I follow the plan pursued by Mr. Gerould.

At this point the Association, on motion of Mr. E. McMillin, adjourned to reconvene at 10 A.M. of the following day—Thursday, May 12.

[To be continued.]

During the six months ended June 30, the Labor Bureau at Castle Garden found employment for no less than 8,615 persons.

[Official Report.—Concluded from page 8.]

Sixth Annual Meeting of the Central New York Gas Engineers Association.

Held at Syracuse, N. Y., Thursday, May 21, 1885.

In response to the Chairman's invitation, Mr. A. C. Wood gave the following interesting particulars regarding the

New Plant of the Syracuse Gas Light Company.

Gentlemen of the Association;—The new erections, as you have seen, have made an extensive addition to our plant as it formerly existed, and it may interest you to hear something regarding the details of the new construction, particularly as these embrace some novel features, and which, I think, without any appearance of self-laudation, I may claim will not be found in many other gas works of this country.

Although we do not claim any extraordinary results from the novel construction of buildings, or disposition of apparatus; yet from our experience with these special appliances, as previously shown in our old works during the past four or five years, we were satisfied to duplicate them in the new, and without material change, except in the direction of increasing their capacity. The practical benefits we have derived from their use have been a freedom from "stopped stand-pipes," almost an entire absence of stoppage of connecting pipes from naphthaline deposit—and the results obtained from the distillation of the coal in quantity and quality of gas made, and amount of enricher used, will compare most favorably with results obtained in other gas works. In view of this we were content to "let well enough alone," and duplicate our old apparatus. The wisdom of this course is apparent from our experience in their workings for the past five and a half months. These have been most satisfactory.

Retort House and Appliances.—In the erection of the new plant we desired to introduce all modern appliances that were of utility; and being satisfied with our own scrubbing and washing apparatus, we turned our attention to an investigation of the different regenerative furnaces in use, and this investigation resulted in our adoption of the "Stedman-Stanley furnace" system. In the construction of a retort house of the desired capacity, adapted to its use, and to carry out our plans for the handling of hot coke from the retorts, we erected a building 63 ft. by 72 ft. 6 in. inside the walls, and 32 ft. in height from ground to wall plate, with firing floor 10 ft. above the ground line. The house to contain two stacks of seven benches of six retorts each—the benches being 7 ft. 6 in. by 9 ft. 4 in., and the retorts 14 in. by 26 in. by 9 ft. inside. The building is covered with a steel-trussed roof and Bangor slate, with the usual ventilation at the apex, and is provided with iron stairs to second story. The building of these benches in single stacks, instead of in double ranges with the retorts back to back, is out of the usual order of things. My reason for this is that in small works (or even up to the contemplated future capacity of this plant—say 1,500,000 cubic feet per day) we can handle the single stacks to better advantage. With the minimum summer make all the gas can be made in, say, seven benches; with a double range you would usually work the benches through and through, thus leaving a portion of the range idle, and wearing it out unequally. With the single stacks we can run from end to end until the retorts are used up, when the bench can be let down, a new setting put in, the stand, bridge, dip pipes, and hydraulic main cleaned out; the result being that after every new setting of retorts is made you start up the bench the same as if it were entirely new. Of course, in large works a double range can be treated in this way. The mouthpieces are of the same size as the retorts, thus facilitating drawing the charges. The stand, bridge, and dip pipes are all 7 in. diameter. The hydraulic main is of wrought iron, provided with a pocket or chamber on the rear side for facilitating the removal of any tar or pitch that may accumulate. This removal can be effected without any stoppage to the making of gas. The main is supported on adjustable chains resting on brackets thrown out from the front buckstaves, thus enabling the main to be adjusted and kept level. A row of iron framed window sashes are placed in the walls of the building directly in rear of and over each stack of benches, giving all the light and ventilation required for the performance of any work necessary to be done on top of the stack.

Each stand-pipe is furnished with a water supply—the water being siphoned into the pipe as has before been described to you, and which we find of great efficacy in relieving us from stopped stand-pipes.

Working the Stedman-Stanley Furnaces.—The operation of working these benches is as follows: All the coke required for the fires is drawn, from the two lower retorts in each bench, directly into the furnaces. As the coke in the other retorts is drawn out it falls through an opening in floor into a car placed below to receive it. The coal is elevated to the charging floor by means of a hydraulic lift of simple construction, and one-half of the retorts in each bench are charged every two hours. The fires are cleaned from the lower floor once every four hours, or previous to each alternate charge. The grate bars are shaken up and the ashes thoroughly shaken out; but little, if any, coke is shaken out with the ashes. Once in four to six weeks the fires are clinkered, when the grate bars are drawn and the furnace cleaned out. We find but little hard clinker, most of it being so soft, or rather that it falls to pieces from slight blows of the clinkering bar; and but little, if indeed any, clinker adheres to the sides of the furnace. That which does adhere is easily detached. After five and one-half months' use the furnaces seem to be in as good condition as when originally started.

We can easily make from 56,000 to 60,000 feet of gas per day in these benches, in accordance with the demands made upon us for gas, condition of the retorts, etc.; and this result is accomplished with a fuel consumption of 25 per cent. of the coke made.

As to the construction and operation of these furnaces I will refer you to the several statements regarding them made by Mr. Stedman at the meetings of the New England Gas Engineers, and the American Gas Light Association, which you will find in the published proceedings of those bodies, as also in the columns of the American Gas Light Journal.

The Coke Conveyor—This apparatus is constructed as follows: An H iron beam is fastened to the under side of the upper floor beams in front of the benches, and parallel with them, extending the whole length of the retort house, and into the yard a sufficient distance to accommodate the storage of the coke. In the yard the beam is supported on iron columns and cross beams properly braced. The wheels of a carriage run on the lower flange of the H beam, and from the carriage is suspended the car, which is of a capacity to receive the coke from six retorts. The coke, on being drawn from the retorts, falls directly into the car, and when loaded is run out into the yard, there dumped and quenched. One man attends to the fires inside, and one to the coke in the yard; those two men also operate the coke conveyor.

Separator and Friction Scrubber.—The gas is taken off at both ends of the hydraulic main and conveyed through a 16-inch wrought iron pipe to the separator and friction scrubber, which are placed in a suitable annex to the retort house.

The separator is a wrought iron tank, 4 ft. by 4 ft. by 6 ft., and receives *all* the contents of the hydraulic main. It is so constructed as to separate the heavy tar (which passes off to the tar tank in the yard) from the lighter hydrocarbon oils, ammoniacal liquors, etc., which, together with the gas, flow into and through the friction scrubber.

You are, of course, familiar with the construction of this friction scrubber. It is of the same style as that formerly used in our old works for several years, and which we have found to be very effective. To its use we attribute our almost entire exemption from naphthaline troubles. From the absorption by the gas of the hydrocarbon vapors in the oils, condensed during its long passage through the scrubber, we find that it adds largely to the illuminating power of the gas. Before putting this scrubber into our old works we used 10 to 12 per cent. of cannel coal to bring our gas up to 20 candles. Since using the scrubber we maintain the same candle power with the use of but 2½ to 6 per cent. of cannel. The connections to the new scrubbers are 16 in., and the gas way through them is of the same capacity; as a consequence we get no back pressure from them. The gas is discharged from the scrubber into a 20-in. main, where it joins the gas made in the old retort house, and thence it passes (under ground) to the exhauster building. There being no back pressure from the scrubber the exhauster is practically at the end of hydraulic main.

Connections.—A 20-in. main extends right through the works, taking off from it 16-in. connections for exhauster, multitubular condenser, tower scrubber, station meter, etc., leaving 16-in. blanks on the branches for the purpose of duplicating these several pieces of apparatus whenever the demand for gas may require such action.

Exhauster.—The exhauster is a Mackenzie rotary, driven by a vertical engine built in this city for the purpose, and is most complete in all its parts.

Condensers and Scrubbers.—The multitubular condenser is of the usual type, with one of Isbell's automatic water valves attached. The tower scrubbers are of our own construction, and are quite effective.

They consist of four towers of cast iron boxes, each tower being made up of 17 boxes, which are 2 ft. deep by 2½ ft. by 5 ft. in size. The boxes being flanged and put together with bolts, makes the total height of each tower 34 ft. For the internal arrangement there are a series of wooden trays, placed one over the other, leaving a space of 8 inches between them. The trays being 4 ft. 4 in. long, or 8 in. shorter than the inside of the box, and placed in the towers so that the short end of the trays are alternately at opposite ends of the box. The gas entering at the bottom of the first tower, flows along through the space below the bottom of the lower tray until it arrives at end of that tray, where it ascends into passage between the lower and next tray above—flowing along that space in opposite direction, and thus continues alternately flowing to the right and left between the trays, and passing up at alternate ends to next space above until the gas arrives at the top of the tower, from which it is conducted through a pipe to the bottom of the second tower. The gas here ascends in the same manner, and so

passes through the remaining towers. Ammoniacal liquor and fresh water is introduced at top of tower, and the trays are so constructed as to hold a half inch depth of liquor or water, which overflows at the short end of tray, dripping from the upper tray to the next one below, and so continuing to the bottom of tower, from which it flows through connecting pipes to the liquor tank. The gas, as it passes over the liquor held in the trays, and through the drippage at the ends, gives up its ammonia, leaving it quite free from that ingredient, and yielding a strong liquor. In three of the four towers we wash with the liquors that have condensed from the balance of the works, together with that from the fourth tower, into which fresh water has been introduced. By using one-half gallon of water to each thousand feet of gas made we get a 12 to 15 ounce liquor, and a gas showing scarce a trace of ammonia. Tanks for water and liquor are provided in the attic over the tower scrubbers, both for them and the multitubular condenser. For the latter the water is pumped from one of the holder tanks into the tank in attic, from thence into the condenser in desired quantities. The water being pumped from the holder tank 18 inches below the surface, is of evenly cold temperature at all times. From the condenser it flows back to, and is discharged on, the surface of the water in holder tank—thus a constant current of warm water running into tank assists *largely* in keeping the seal water free from ice. From the tower scrubbers the gas is conveyed to our old purifying house, which we still have in use, and from thence sent on to the station meters and holders.

Station Meters, etc.—Two station meters are provided, one (of 1,000,000 cubic feet daily capacity) purchased last year, the other (of 500,000 cubic feet daily capacity) has been in use for a few years. These are placed side by side, with their fronts in engine room, while their bodies and connections are in the next or condensing room. The meters were so placed that the engineer could at all times "have an eye" to the gauges without leaving the room. In the engine room we also propose to erect an annunciator, which will be joined with every connection to the different apparatus throughout the works, thus instantly locating a stoppage and attracting the engineers attention to same.

The boiler house is provided with two horizontal flue boilers, either of sufficient capacity to drive the exhauster at the maximum make of gas; also to furnish all necessary steam for heat, and pumping liquor, water, etc., about the works.

The shop is provided with a steam engine for the forges, drills, lathes, etc. This engine can also be used as an auxiliary for driving the exhauster in case of need—a line of shafting being run to exhauster room for that purpose. The shop is also provided with all tools and machines for effecting necessary repairs required about the plant.

There are storerooms for supplies and materials. In the second story, over the exhauster room, is a private office for the superintendent; also draughting, experimental, and photometer rooms. The cellar under exhauster and condensers is 11 ft. in the clear, thus securing head room under connecting pipes, also light and ventilation. Wall lights are so placed that all parts of the works can be inspected in the night time.

Conclusion.—We have erected this plant with an estimated capacity to manufacture and supply 750,000 cubic feet of gas daily; and have arranged the buildings and connections so as to double that amount. This can be accomplished by duplicating the present new retort house and appurtenances, together with duplication of exhauster, condenser, tower scrubbers, station meters (as arranged for in the present buildings), and a new purifying house and purifiers. This will enable us to make at least 1,500,000 cubic feet daily. When we shall require to meet that send-out of gas our apparatus will be so arranged that we will not be obliged to run our summer make of gas through an apparatus of double the required capacity. So far as I am concerned there are no patents on these appliances nor their arrangement; and if any one of you should be desirous of adopting either the whole or any part thereof you are welcome so to do. We certainly have obtained most satisfactory results from their use.

Discussion.

Mr. Harbison—You state that it requires about 25 per cent. of the coke made for fuel supply to the furnaces. Does not Mr. Stedman claim to run his with, say, 22½ per cent. of the coke made? And can you not obtain equally as good results?

Mr. Wood—Yes; without doubt, under the same conditions that Mr. Stedman operates his benches in the handling of coke, etc. The surplus coke, as it is drawn from our retorts, falls some 8 or ten feet into the car below, and as a result of that fall it is somewhat broken up. Perhaps you noticed that the coke pile in the yard contained no large pieces, as is the case when it is drawn from the retorts in the ordinary way. It is of more uniform size, and is in better merchantable condition. Being of smaller size, it will not measure quite as many bushels as that which Mr. Stedman claims for his surplus. Again, there is more or less breeze left on the ground where the coke is dumped from the car. This breeze we use under our boilers, and in my statement was not taken into account. The 75 per cent. of surplus coke is that in merchantable shape for sale and use. I presume this will account for the difference of, say, 2½ per cent. that you have spoken of.

Mr. Harbison—I have no doubt this accounts for the difference.

The President—Is there any other member of the Association who desires to ask Mr. Wood any questions?

Mr. Hequembourg—I think, with the inspection of the works and listening to the paper read by Mr. Wood, that we have an understanding of the matter; and I move a vote of thanks be tendered him. (Carried.)

The question-box was then opened, and a profitable hour was occupied in a discussion of its contents. When the last query had been answered, on motion, a hearty vote of thanks was given Mr. Wood for his hospitality and kindly attention to the wants of the Society and its guests.

On motion, the Association adjourned subject to the call of Chairman and Secretary.

Dinner and Adieus.

After adjournment of business session the party proceeded to the Globe Hotel, where an elegant dinner awaited them. The substantials demolished, Mr. Wood, acting as toastmaster, spurred on the flow of wit and merriment; and his efforts were ably seconded by the members and their guests. When the festivities terminated and the hour for parting had arrived, all concurred in the view that the Sixth Annual Meeting of the Central New York Gas Engineers Association had been about the most successful one in its history; and this fact has nerved its members to continue on in the good work, so that the records of 1886 will even eclipse those of its predecessors.

Cooper's Coal-Liming Process.

By G. S. P.

This process has now been in continuous operation at the Tunbridge Wells (England) gas works for a period of nineteen months. The make of gas at this plant is about 120,000,000 cubic feet per annum. Practically all the work of purification has been done through a single purifier. At the end of thirteen months the purifier was opened and emptied, one-half of the oxide being at once returned to the trays (the object being to allow greater space for its expansion), and the other half was placed in store for future use. The quantity or weight of oxide originally placed in purifier box was 30 tons, and that weight, as noted above, was reduced to 15 tons. The cost of purification material is placed at $15 for a period of nineteen months. The nuisance formerly caused by the opening of purifier boxes is now wholly avoided, and the atmosphere in the vicinity of the works is not affected in the slightest degree. Recent experience, it is claimed, has shown that with coal containing about twice the usual quantity of sulphur the sulphur compounds will be increased proportionally, and the simple remedy of increasing the percentage of lime used in the charges to retorts has been found effectual in reducing the impurity to about 12 grains per hundred cubic feet. The production of ammonia has been increased by over 30 per cent., which increase nearly compensates for the reduced market value of that product. The calorific value of the coke is greater than that produced from unlimed coal; and this fact has increased the demand for it as a fuel, while it has also reduced the fuel weight required in the carbonization of the charges. As neither preparation nor outlay of any sort is needed for the introduction of this process, immediate relief could be obtained in small works, or where the purifying boxes are not equal to present requirements, without the expense of further addition to the plant.

The Late M. Servier.

The *Journal of Gas Lighting* for June 9th contains the following statement containing the life and work of that justly celebrated French engineer and editor—M. Edouard Servier:

Our readers will remember that in the *Journal* for the 26th ult. we briefly announced the death of M. Edouard Servier, Editor of the *Journal des Usines a Gaz*, which sad event took place on the 16th ult, as the result of a long and painful disease. We have just received the following particulars in regard to the life and work of the deceased (from the pen of his colleagues, MM. Jordan and Mounier), which appear in the current number of the above-named journal. These two gentlemen were intimate friends of M. Servier for a period of thirty years, having been fellow-students with him at the Ecole Centrale, while later in life they found themselves working in the same direction—all three being engaged in the gas industry. In 1877, when several members of the Société Technique decided to start the *Journal* (which commences its ninth year of existence with marks of mourning), MM. Jourdan and Monnier accepted with M. Servier the mission of forming the administration of the modest Society by whom it is published; his part of the work being, however, necessarily the more important, since he was

charged with the editing and general management of the paper. His *collaborateurs* remark that it is not for them, nor is the present the time, to refer to his success in the career of technical journalism in which he had embarked. The readers of our contemporary have, they say, been able themselves to appreciate the value of the productions from his pen—at once learned and brilliant; but the duty devolves upon them to express the gratitude of those by whom the *Journal* has been issued for the distinguished and disinterested services rendered to it by their late friend. The desire to be useful to his colleagues in the industry in which he was engaged was the single motive by which he was actuated, as the satisfaction of having been of service to them was the only remuneration which he desired for his work. The *Journal* was not for him, any more than for its founders and proprietors, an undertaking which was intended to be a source of pecuniary gain. Until the last moment M. Servier fulfilled his editorial functions; and in the number for the 5th ult. appeared the last article written by him—viz., that on the gigantic tower project of M. Bourdais, which showed that his intelligence was still quick and his animation unaffected.

On Monday, the 18th ult., a large assemblage of relatives, friends, and colleagues followed Edouard Servier to his last resting place. The Paris Gas Company were represented by MM. Camus and Godot, Director and Sub-Director of the Company, M. Arson, Engineer-in-Chief, and many of their engineers and officials. A large number of directors and managers of provincial and foreign gas companies were also present. The Committee of the Société Technique, and many gentlemen connected with the manufacture of gas and of the appliances used therein, joined in the long cortege, which proceeded first to the Temple de l'Oratoire, where M. le Pasteur Viguié (who presided at the religious ceremony) recalled in touching language the principal traits of the character and career of him around whose remains they were assembled. At the cemetery of the Père-Lachaise, where the interment took place, M. Eugene Breittmayer, President of the Société Technique, delivered the following address:

"It is in the name of the Societe Technique de l'Industrie du Gas en France, of which Edouard Servier was one of the founders and also one of the Presidents, that I am about to address a few parting words to the friend whom we have just accompanied to his last resting place. Servier was a child of Paris. After having passed through a course of severe study he entered, at the age of 20, the Ecole Centrale, which has given to France so many distinguished engineers and eminent men. There he was a prominent pupil, and left the school in 1855 with a first diploma of 'engeneur chemiste.' He subsequently entered into the service of the Paris Gas Company, where during twelve years, under the supervision of that eminent engineer M. de Gayffier, and under the immediate orders of M. Arson, he studied and acquired a knowledge of all the details of the important industry of gas supply, not only in regard to the construction, but the management of gas works. Notwithstanding his occupations he found time to translate and write a commentary upon the great work of the English engineer Clegg, and of the still more important one of the German savant Dr. Schilling—two works of the highest value, which were absolutely wanting in France, and which every engineer and manager of gas works should have constantly upon his table. When Servier left the Paris Gas Company he started, on his own account, as consulting engineer, and was entrusted with the construction and management of several works. Afterward, in 1869, he undertook the direction of the Metz Gas Works, and this position he held for seven years. He was at Metz during the siege, and took service in the artillery as a volunteer, employing himself energetically, in company with other engineers, in the manufacture of projectiles, in the hope of making a long defence. Returning to Paris after the war, he resumed his professional duties as consulting engineer, and became the adviser of several gas companies and financial establishments in regard to the conduct of their works. In 1874, having recognized, with a certain number of colleagues in the gas industry, the utility as well as the necessity of studies made in common, he became one of the founders of the Societe Technique, of which he was President in 1878. In the previous year he undertook, in association with a few friends, the publication of the *Journal des Usines a Gaz*, which was intended to be the organ of the Societe Technique. In 1878 he was a very active member of the juries of the exhibition held in Paris in that year, and later he was appointed on those of the exhibitions of Rouen and Amsterdam. An indefatigable worker, Edouard Servier had reached an important and honored position in the gas industry when a terrible malady struck him in the vigor of life and in the full posession of his talents.

"But, besides the engineer, there was the man—loyal and benevolent—whom we all knew. I still see him with his cheerful countenance, his intelligent eye, and his bright smile, as he gave one a cordial shake of the hand. He was quick to discern the weak sides of men and things, and always expressed his views in telling and humorous language (for he had a great fund of humor—in fact, enough and to spare); but he was never malicious, and I never heard him speak ill of anyone. It will be a consolation—at least it will alleviate the grief of his family and those belonging to him to know what unanimous regrets and what an excellent souvenir he leaves behind him."

MM. Jordan and Monnier conclude their brief notice of the late M. Servier by remarking that they will not add anything to M. Breittmayer's words, as they intend to publish, in an early number of the *Journal*, an obituary notice of the life and labors of their deceased friend.

Cambria Iron Company's "Crinoline" Chimneys.

The American Society of Civil Engineers has been discussing, to some extent, the design and construction of chimneys. Mr. Geo. Webb, of the Cambria Iron Company, of Johnston, Pa., gave the following particulars in regard to the "crinoline" chimneys of that company:

The chimneys are connected to the boiler house by underground brick conduits, and are intended as "uptakes" for the unused gases. The surplus gases are used for generating steam, and but little is left after passing under the boilers. Sometimes the fires under the boilers must be reinforced with raw coal, in which case the chimneys convey some smoke. The ground is bad, and hence there is a deep foundation of masonry below the surface. From the entrance of the conduit to about 8 feet above the surface the base of the chimney is hexagonal, of hammered stone, surmounted by a cut stone coping. Six 3-inch anchor bolts are built into this base, and provided with suitable nuts to hold down a base plate 4 inches thick, and with an upward projecting rim 6 inches high around a circle 12 feet in diameter. From this base-plate it is 140 feet to the top of chimney. At the top is a molded cast iron plate similar to the base-plate, with the rim projecting downward, 10 feet 2 inches in diameter. The batter, therefore, is 22 inches in 140 feet. Between these two plates the "crinoline" is constructed. It consists of 16 vertical lines of ordinary wrought iron railroad rails, 4-inch base, with the base outward, surrounded by 45 hoops. The rails may be in sections of any length which will allow of the splice being riveted to a hoop, care being taken to avoid having more than one rail splice on the same hoop. Well-selected old iron rails with good bases, or sound sections of No. 2 or No. 3 rails, are as good as any.

The hoops are of wrought iron rolled from iron ¾-inch thick. Each hoop is in two pieces, bent cold to a true segment in a wedge-adjusting bending machine, which allows any desired delicacy of touch. The piece lies on edge while being bent, the "former" being more readily tried in that way. If bent hot the curve cannot be maintained while cooling. The two halves of each hoop are spliced on the inside with flat plates, secured with four rivets and one bolt in each end of each section, care being taken that at least three hoops shall intervene solid before another hoop splice is made between the same verticals. There are 45 hoops, the bottom one being near the base-plate projection, and therefore about 12 feet in diameter. The distance in the clear from this hoop to the next one above is 22 inches. The clear distance between each pair of hoops gradually increases from the bottom to the top, the distance in the clear between the top hoop and the next below being 54 inches. Each hoop is riveted to each rail with two rivets—one in the upper flat space of the hoop, and the other on the other flange of the rail in the lower flat space of the hoop.

The iron skeleton thus made is so stable that no scaffolding is used in construction. Two boards across a lower ring will hold a portable forge. A rail section is hauled up, put in place, adjusted and riveted; then others in the same way. The center opening of the chimney is 8 feet, which is preserved throughout. The bricks fill from this center opening to the inner side of the hoops, special bricks being molded to fit aronnd the rail heads, and thus save time and waste of cutting. To save cutting bricks the masons carried the inside parallel with the outer batter, and when the inside got to 8 feet in the clear they set back on the inside to an even brick, and then followed the outer batter until the inner diameter reached 8 feet again, and so on. There are about 1,000 bricks average to 1 foot in height of stack. Five bricklayers and nine laborers lined the first chimney built in 21 days; the next in 18½ days. They used no scaffolding but two scantlings and a few boards on the inside at convenient intervals, thus leaving a well-hole open the entire height. These were removed from the top downward after completion. A light iron ladder is riveted to, say, every 3d hoop the entire height. The convenience of this for construction, examination and repairs, if needed is obvious.

The strength of this chimney is in the "crinoline." The bricks are merely for inclosure of the gases. Their mass is so small and their walls so thin that they are never hot. The "crinoline" of the first chimney was built the entire height before the brickwork was begun. Some heavy storms occurred while it stood thus, and it never wavered.

Williamsport, (Pa.) Capitalists have invested $100,000 in the establishment of a central incandescent lighting station on the Edison system. They started in with the Edison meter, but abandoned it after a short trial.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Street Lighting at Detroit, Mich.—The Detroit Gas Light Company, in response to invitation extended by city authorities for proposals for maintenance of street lighting, as also illumination of public buildings, for a period of one year, offered to supply gas to city gas lamps in the number of 2,000, and maintain and light 1,782 naphtha lanterns, at a gross total cost of $40,000 for the twelvemonth. The company also offered to supply gas in public buildings, markets, etc., at the figure of $1.50 per thousand. The Brush Electric Light Company agreed to supply light from 90 towers (359 lights), 23 single arcs, and light public buildings and markets with *gas* (so our information goes) at a total annual cost of $89,300. It seems surprising, to say the least of it, that an electric lighting company should agree to furnish gas after all we have heard about the superiority of electricity, etc. It would not be such a wonderful thing, after all, if it did turn out that Detroit finally decided upon "doing away with the towers." The difference in the cost of electricity over gas is certainly very great, and the Wolverines know by this time, from their practical experience of the past year, that arc street lighting is at once a "delusion and snare."

Personal.—Mr. W. E. Seip, formerly in charge as superintendent of the Eau Claire (Wis.) Gas Light Company's plant, has removed to Bloomington, Ills., where he will have direction over gas affairs. About the first move made by Mr. Seip at Bloomington was to start up the old coal gas system, in order that the water gas works might be made the subject of extensive repairs, which they sadly needed. When Mr. Gridley was alive things went on smoothly at Bloomington; but Mr. Gridley was a firm believer in the sterling value of a good article of coal gas. We hope Mr. Seip will succeed in "taking the tangle" out of the Bloomington situation. He is a clever and "plucky" member of the fraternity, and we wish him all prosperity in his new field of labor.

"It Served Him Right."—A correspondent writes as follows: "*Mr. Editor:*—In Journal for July 2d a portion of Mr. E. J. King's remarks, when discussing the subject matter of Mr. G. A. Hyde's paper 'On the Pressure of Gas in Street Mains,' is very interesting, and particularly so where he speaks of the meat being 'maggoty;' but I note that he speaks of it as a mystery. Now, I am not a 'scientific cuss,' yet it strikes me that what he deems so fraught with mystery may be quite easily explained. The meat was 'blown'—at least I should so infer from the balance of his remarks; there evidently was a 'mitey' wind. The genius who perpetrated the above has since succumbed to a visitation of Providence—*i. e.*, an attack of water gas. Yours, etc., CO."

Natural Gas at Olean, N. Y.—The Keystone Gas Company, of Olean, N. Y., which is a purveyor of natural gas, charges $4 per month for the gas supplied to an ordinary cooking stove; heating stoves, when kept in connection during the entire year, are charged for at the rate of $1.60 per month each during the heated term. Consumers, should they so elect, may receive their supply of gas for heating and illumination at the rate of 50 cents per thousand cubic feet.

Crying Aloud in Bitterness of Spirit.—The water gas gentry at St. Louis, Mo., are in a pretty mean state of mind over the action taken by the members of the city councils toward the last of June. The St. Louis *Republican*, of date of June 20th, in reporting the matter, said: "The recent history of the gas question can be briefly told. A few days after both houses of the newly-elected Assembly were chosen they were convened in special session by Mayor Francis, and a bill was then introduced in the house of delegates authorizing the water gas company to supply the city with illuminating gas after 1890. This bill passed through the usual course, was read, referred, and favorably reported upon by the committee who had charge of its consideration. It came up for final reading and passage last Friday night, and the greatest interest was felt in the fate of the measure. Prior to its debate, however, Mr. Monahan introduced a resolution, as a kind of substitute, providing for the appointment of a joint committee to consider the subject of the manufacture and sale of gas, and authorizing the committee to sit during the summer. It was understood that this measure was satisfactory to the managers of the old St. Louis Gas Company. The debate was stormy, and the deliberations were marked by the usual criminations and recriminations. The course of every delegate was eagerly watched, and when the vote was finally reached a careful tally was kept by the representatives of the gas companies interested. Mr. Monahan's resolution was defeated by a tie vote—13 to 13. The water gas men were highly elated with this victory, and in the glow of their triumph the water gas bill was taken up and passed. In the meanwhile the coal gas people were not idle, and on the following Thursday (June 18) Mr. Monahan's resolution was introduced in the Council and easily passed, and the water gas bill, reported from the house, was referred to the committee of the whole. The house of delegates met on night of 19th, and passed the Monahan resolution, thus completely reversing their action of the previous week. The vote this time was 15 ayes to 12 noes. This was a terrible defeat for the water gas people, and they made no effort to conceal their chagrin." Now, as is usual with these odoriferous operators, they were not slow in making insinuation to the effect that corrupt motives induced this change of front (or vote) on the part of the delegates. It is to be expected that they would reason in this manner, knowing full well themselves that "potent arguments" are often advanced by those anxious to secure opposition charters. In regard to Mr. Keenan, representative from the 4th St. Louis ward, and who changed his vote on the Monahan resolution, it may be said that he voted originally under a misconception of the matter; and when the thing was explained to him he (Keenan) determined to accede to the wishes of his constituents. The Laclede Gas Light Company's works are situated in the Fourth ward, and one of the employes of that company was originally selected as delegate for the district, but resigned in favor of Keenan. Now, be it known that the Laclede Company is not a supporter of the St. Louis water gas prowlers, and also be it known that the men employed by that company are in no way desirous of being deprived of their living, consequently it required but little argument to convince delegate Keenan of the error of his way, provided he had the ambition or desire to succeed himself as the representative from that district. Certainly, the first thought that occurs to the minds of the water gas operators, when they experience a check in council boards to the passage of their schemes, is to cry fraud. They know the sort of "arguments" that are often employed; indeed, they do.

Glad to Know It.—As an evidence that all departments of trade are not at a standstill, Messrs. Connelly & Co. (Limited), of Pittsburgh, Pa., furnish the following convincing testimony in the nature of shipments made by them during the two weeks ended July 3d:

One 20-inch governor to Consolidated Gas Light Company, of Baltimore, Md.; one of same dimension to Milwaukee (Wis.) Gas Light Company; one 10-inch governor to Capital City Gas Light Company, of Des Moines, Iowa; one 8-inch governor to Keokuk (Ia.) Gas Light Company; 6-inch governors to the Shelbyville, Columbus and Greenville (Ind.) Gas Light Companies; and instruments of same size to Pekin and Danville (Ills.) Gas Light Companies. One exhauster went to Greenville, Pa., and two carloads of iron sponge were shipped to Boston, Mass. Later orders include the following: A 20-inch governor to the Cincinnati (Ohio) Gas Light and Coke Company; a 6-inch exhauster to the South Bethlehem (Pa.) Gas Company; and one carload of sponge to the Charlestown (Mass.) works. Beyond a doubt the gas men of the United States mean to do some business this coming winter; and Connelly & Company have our congratulations.

Mr. Monnett Responds.—In response to our invitation contained in last number of the Journal, Mr. O. B. Monnett, of the Bucyrus (Ohio) Gas Works, writes that the "dip" is made from a leaching of the waste lime of gas purification. The leach is carried on as long as the resultant liquor possesses a certain strength. To 40 gallons of the liquor a certain proportion of blue vitriol is added. The inventor concludes with the statement that no better preparation for the curing of foot-rot, scab, removing lice from the bodies of all classes of live stock, healing sores on horses, etc., is at present on the market. Mr. Monnett claims that there is a large profit on its manufacture and sale, and adds that any gas company doing business in stock raising districts would find it advantageous to investigate the merits of the "dip." Mr. Monnett will sell the right to manufacture it over any section of the country.

Certain Rumors Taking Tangible Shape.—For some time back Dame Rumor has been busy in the promulgation of mysterious hints as to a deal that was about to take place between the shareholders of the South Boston (Mass.) Gas Light Company and that sweet-scented philanthropist, Mr. Addicks, of the Bay State Gas Company. While it was pretty well understood that "something was going on," no tangible evidence was presented until some few days ago, when the following appeared in a Boston newspaper. We give it for what it is worth, and are inclined to believe that the statement contains much of truth:

"The rivalry between the different gas interests of this city promises to take on a new phase by the transfer of the control of the South Boston Gas Light Company from the conservative stockholders who have held it to some parties in Philadelphia, Pa., who are said to be backed by the Standard Oil Company. This is the outcome of several attempted negotiations, and is thought by gas men to have some bearing on the contest in this city. Several weeks ago a meeting of the directors of the South Boston Company was held, and a motion was passed authorizing the Treasurer (Mr. R. J. Monks) to sell the stock represented, at the price of $110 per share, to Mr. Addicks, of the Bay State Company, provided that Mr. Addicks would agree to take,

at this price, all the stock that might be brought to him within sixty days. Mr. Addicks at the time would offer no higher figure than par, and, further, was only desirous of purchasing a mere controlling interest in the company without taking all the stock that might be tendered him. Accordingly the trade fell through. The stock of the South Boston Company some time ago was held at as high a valuation as 140; but the electric lighting competition caused something of a decline, and the efforts of rival organizations to obtain a footing in the city accelerated this shrinkage until the price had dropped to 120, and in some cases even par was reached, although the less timid shareholders held their stock as worth a higher rate. Acting under the vote of the directors authorizing him to sell at 110, Mr. Monks went about among the stockholders and easily obtained power of attorney to sell a majority of the stock at 110, with a condition that the new purchasers should take all that might be offered in 60 days, and that the July dividend should accrue to the old holders. A former stockholder recently said that Mr. Monks had probably secured eight-tenths of the stock for transfer to the new purchasers. By the reported terms of the bargain the purchasers were to pay for the stock on July 10th, provided Mr. Monks had secured control by July 6th. The whole number of shares in company is 4,400, or a total par value of $440,000. The purchaser is understood to represent a syndicate that already owns gas works in several cities of the country; and, as said before, this syndicate is reported to be connected with the Standard Oil Company. It is further reported that this movement is instigated by some of the parties interested in the Consumers Company. It is asserted that Mr. Monks will retain his position as Treasurer under the new management. The South Boston Gas Light Company has, by its charter, the right to lay pipes throughout the city, and the same right belongs by charter to the Boston Gas Light Company. The consent of the new State Gas Commission would have to be obtained before the streets could be dug up; but should that consent be given it might result in a very spirited contest between the rival companies. It has been, by courtesy and agreement, that the several coal gas companies in the city have heretofore respected each other's territory, and now that one of them is in hostile hands, there will very likely be an effort made by one to invade the territory of the other, with natural retaliatory action on the part of the threatened company. It is intimated that Mr. Addicks would have been willing to increase his bid had he known that a strong competitor was in the field. It is now stated, however, that the bargain has been practically consummated." We cannot quite understand on what ground Mr. Monks justifies his action, unless the stock of the South Boston Company was no longer worth $110 per share to the people who had controlled it for such a length of time—and who had made so much money out of it, too. If it were not worth that price to the insiders, how could it possibly have such value to outsiders. We also suppose that the stockholders, who parted with their shares so readily on the representations made to them by Mr. Monks, will not receive any solace in the shape of lucrative positions or berths under the new management. Truly, if the report given above be correct, it looks like a cowardly sell-out on the part of the South Boston Company, and the old Boston Gas Light Company has received a rather mean stab from those whom it had every moral reason to suppose were staunch friends.

Would it not be Made Hot for Them?—Some of the wiseacres have been busying themselves by asserting that Eastern capital was about to knock at the doors of the Cincinnati (Ohio) Councils in the attempt to establish an opposition gas plant within the precincts of the "big city of the Buckeye State." Rumor had it that the aforesaid capital was willing to go on with *bona fide* opposition measures, or would be willing to make something out of the Cincinnati Gas Light and Coke Company by selling out. If General Hickenlooper and Lieutenant Ross could not make it hot for that Eastern capital—yea, verily; even though it were in the middle of an Ohio winter—we are out of our reckoning. The managers of the "Imp." companies "know a thing or two" about the General.

Underground Wires in Brooklyn, N. Y.—The three Commissioners who have been appointed to take charge of placing underground the telegraph and other electrical conductors in Brooklyn, within the time specified by law, met on the evening of July 9th and organized for duty. The Commisioners are, beyond a doubt, excellent men, and Brooklyn is to be congratulated thereupon. The *personnel* of the Commission is as follows: George W. Plympton, Prof. Rossiter W. Raymond, and John Reynolds. At the meeting spoken of Mr. Plympton was chosen President, and Mr. Reynolds named as Secretary. A resolution was passed to the effect that each company should furnish to the Commission, on or before August 12th, a description of the plant in which it proposed to place its electrical conductors underground, together with a full statement of the nature, location and extent of its conduit system. If a company failed to supply this statement within the prescribed time limit, reasons for such failure must be filed. The same resolution provided that no new wires or poles could hereafter be erected without permission of the Board acting in conjunction with the Department of City Works. Mr. Reynolds suggested that the Board should make as full an inquiry, as the limited time would admit of, into the subject before it; and he also secured the adoption of a resolution inviting all persons or corporations interested in the adoption of a general underground electrical system to present their views in writing, or otherwise, as speedily as possible. We have great hope that the Brooklyn Commission will attend to its duties with promptitude and fairness. Its members are honest-minded and capable gentlemen.

Now for the New York City Commissioners.—If we may congratulate Brooklyn over the composition of her electrical commission, we certainly can condole with the sister city of New York in regard to the "eminent" worth and "professional" capacity of the old political hacks appointed to take charge of similar matters in the Metropolis. Here they are, with their occupations: Theodore Moss, theatrical manager; Jacob Hess, butcher; and Charles E. Loew, steamboat excursion manager. Of course all of the three were appointed because they each possessed an enormous fund of electrical acumen, and were entirely conversant with the features of the work they were appointed to order and supervise. Jacob Hess, butcher, is to receive $5,000 per annum (his associates receive the same salary), and he knows—well, he will know how to draw the monthly stipend, and "spend a portion of it on the boys."

Streets Unlighted.—It was expected that the new electric lights would be put in operation in the Eastern District of Brooklyn (at any rate those on First street and Broadway) on the evening of July 7, and the authorities instructed the Williamsburgh Gas Light Company not to light the gas lamps on those thoroughfares on that date. The gas lamps were unlighted, but the arcs failed to shine; and the two streets were left to gloomy darkness. The Western District arcs (or at least a certain number of them) were lighted for the first time on the evening of Wednesday, July 8. They were the 1,200-candle power article, paid for at the rate of $182.50 per annum each; and without the slightest exaggeration two 5-feet gas burners would have given a much superior illumination. Beyond a doubt the Brooklyn specimen of arc street illumination is the weakest one that was ever presented in this or any other country. It must be seen in order that its true wretchedness may be appreciated.

A Mysterious Murder.—Mr. Geo. S. Dunbar, a native of Pittsfield, Mass., and Superintendent of the Pittsfield Gas Company since date of 1869, has been made the victim of a most atrocious and mysterious murder. The crime was perpetrated on the night of July 4, the dead body of the Superintendent being found in the street at only a short distance from the gas works. The left eye was bruised, and a pistol ball had penetrated the skull at the base of the brain. A five-chambered 32-calibre revolver was found near the corpse, and one of the chambers contained an unexploded cartridge, while a second chamber held the cap of the cartridge that had done its fatal work. At about 9:30 P.M. of July 4 Mr. Dunbar explained to his wife he would pay a short visit to the works, in order that he might assure himself as to the condition of affairs there, and it was while returning from this visit that he met his death at the hands of some vile assassin. The object of the murderer was robbery, as deceased usually collected the accounts due the company, and the July quarterly collection had been pretty well advanced. Up to present advices (July 11) no clue to the author of the crime has been discovered. The selectmen of the town have offered a reward for the detection of the assassin; the gas company and widow of deceased having supplemented that action. Mr. Dunbar was 48 years of age, and possessed a great turn for mechanics. He was well known among the Eastern fraternity, and had amassed a competence. We would ask the officials of the Pittsfield Company to forward us the developments as they appear in the future history of this mysterious case.

Measuring the Candle Power of a Light.—The *Electrician* says that "the candle power of a light may be approximately calculated by comparing the shadow cast by a rod in the light of a standard candle with the shadow cast with the light to be tested. By moving the latter toward or away from the rod a point will be reached at which the shadow cast by both lights will be of the same intensity. The intensities of the two lights are directly proportional to the squares of their distances from the shadows—*i. e.*, suppose the light to be tested is three times the distance of the candle, its illuminating power is nine times as great." Perhaps.

New Apparatus.—The Chicago (Ills.) Gas Light and Coke Company's managers have ordered two "Standard" washer-scrubbers, each to be of one million cubic feet capacity. The machines are to be constructed at once, and when completed will be installed in the extension made to that section of the plant known as the "North Side Station."

Annual Meeting.—The 34th meeting of the American Association for the Advancement of Science will be held at Ann Arbor, Mich., beginning August 21st and terminating September 1st.

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THURSDAY, JULY 16, 1885.

The Market for Gas Securities.

The city share market has been quite listless and weak. We quote Consolidated (July 14) at 94 bid, offered at 95. The Equitable "peggers" stick to their figures. Fulton Municipal (Brooklyn) has declared a quarterly dividend of 3 per cent.; Nassau (Brooklyn) pays a 2 per cent. quarterly. St. Louis (Mo.) Gas Company managers divided up $90 per share.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 WALL ST., NEW YORK CITY.

JULY 16.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	94	95
Central	440,000	50	60	70
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	136	140
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	130	132
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	129	131
Citizens	1,200,000	20	86	88
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	158	160x
" Bonds	300,000		104	108
Peoples	1,000,000	10	82	83
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	94	96
Nassau	1,000,000	25	125	127x
" Ctfs	700,000	1000	98	99
Williamsburgh	1,000,000	50	151	153
" Bonds	1,000,000	—	111	114
Richmond Co., S. I.	300,000	50	64	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	103	115
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	128	132
Peoples G. L. & C. Co., Chicago, Ills			8	12
Cincinnati G. & C. Co.			180	182
Consolidated, Balt.	6,000,000	100	42	43
" Bonds	3,600,000		107	107½
Central, S. F., Cal.			—	58
Capital, Sacramento, Cal.			56	—
Hartford, Conn	750,000	25	123	129
Jersey City	750,000	20	145	—
Laclede, St. Louis, Mo.	1,600,000	100	100	105
Louisville, Ky	1,500,000	50	95	100
Montreal, Canada	2,000,000	100	181	182½
New Haven, Conn		25	166	170
Oakland, Cal			29	30
Peoples, Jersey City		—	45	—
" " Bonds			—	—
Paterson, N. J.		25	90	—
Rochester, N. Y.		50	75	80
Washington, D. C.	2,000,000	20	212½	—
Wilmington, Del.		50	199	210
Yonkers		50	41	44
St. Louis, Missouri	600,000	50	—	315x
San Francisco Gas Co. San Francisco, Cal.			56¾	57½
Havana (Cuba) Gas Co.	3,000,000	100	8	—
" Bonds	550,000			

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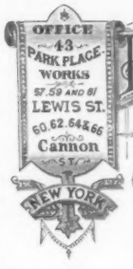

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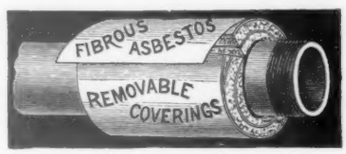

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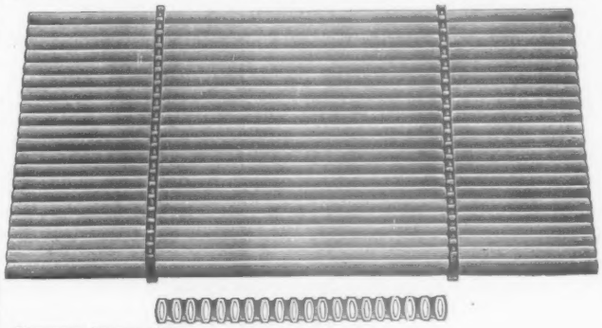
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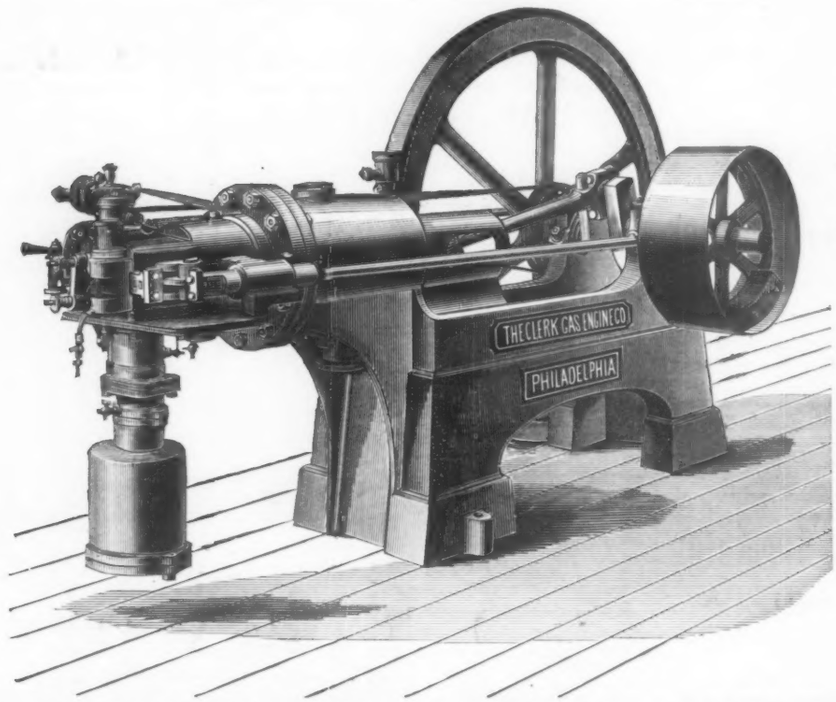

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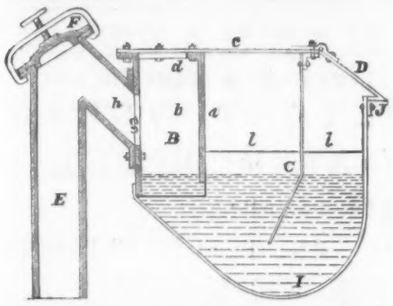

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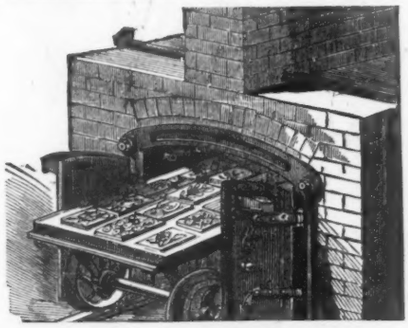

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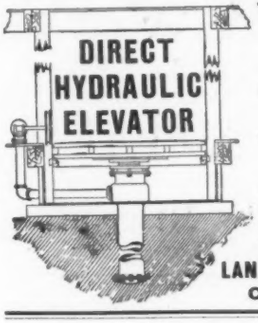

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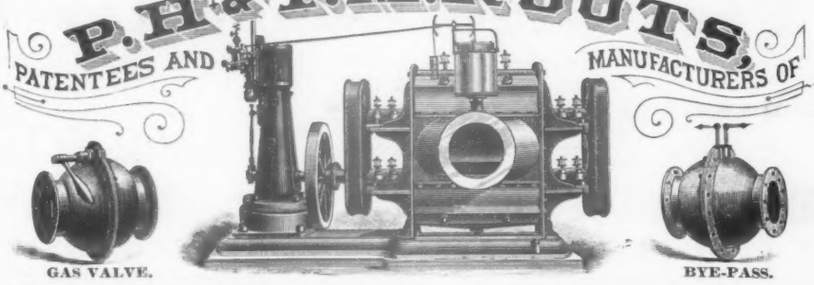

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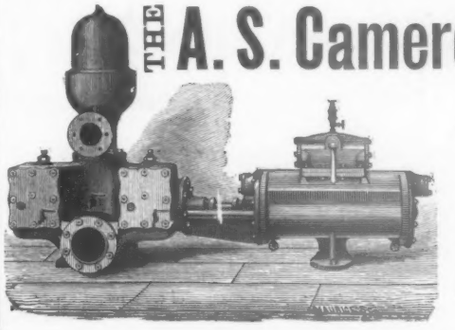

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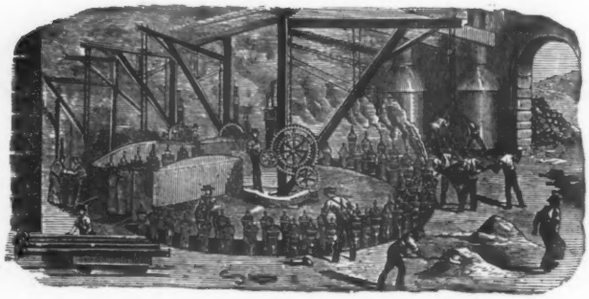

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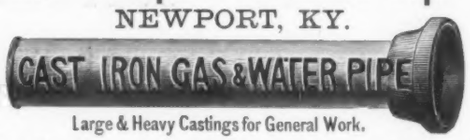


Large & Heavy Castings for General Work.

Branch AND SPECIAL CASTINGS FOR GAS & WATER Co's.

Manufacture Pipe from 2 to 48 inches. All work guaranteed first quality.

Mellert Foundry and Machine Co.

Limited. Established 1848.

MANUFACTURERS OF

Specials—Flange Pipe, Valves and Hydrants, Lamp Posts, Retorts, etc.

Machinery and castings for Furnaces, Rolling Mills, Grist and Saw Mills, Mining Pumps, Hoists, etc.

GENERAL OFFICE, - - - READING, PA.

CAST IRON

Gas and Water Pipes,

From 2 to 48 Inches in Diameter.

FOX & DRUMMOND,

160 Broadway, N. Y. City.

LUDLOW VALVE MFG. CO.

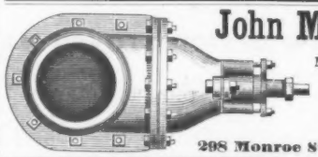
OFFICE AND WORKS,

938 to 954 River Street and 67 to 83 Vail Av.

TROY, N. Y.

Hydraulic Main Dip Regulators, also Check Valves, Foot Valves, Yard-wash and Fire Hydrants. Send for Circulars.

Valves.—Double and Single Gate, ¾ in. to 48 in., outside and inside Screws. Indicator, etc., for Gas, Water, Steam, and Oil. nd for Circulars.



John McLean

Man'facturer of

GAS VALVES.

298 Monroe Street, N. Y.

WELSH "ABERNANT"

Silica Dinas Fire Brick & Cement.

Unrivaled for Endurance Under Intense Heat. Percentage of Silica, 95.64.

Also SCOTCH "BLOCHAIRN" FIRE BRICK.

A. T. CHUR,

SOLE AGENT FOR THE UNITED STATES,

Mills Building, Room 14, Fifth Story, New York.

Siemens's Regenerative Gas Burners,

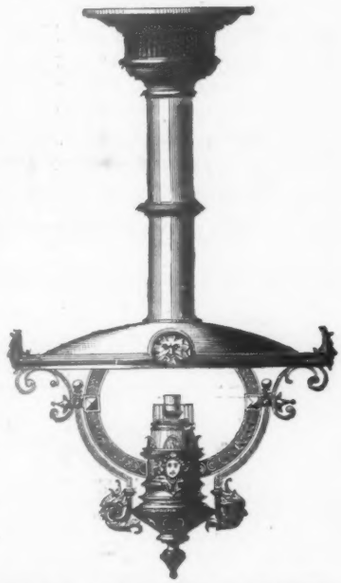
For Lighting and Ventilating.

THE CHEAPEST, PUREST, AND MOST BRILLIANT OF ALL GAS LIGHTS.

Superior to the Electric Light in Economy, Beauty, & Steadiness.

SPECIALLY ADAPTED FOR LIGHTING HALLS, FACTORIES, OPEN SPACES, ETC.

Numerous Tests made by various Gas Companies in the United States show an Efficiency of Ten Candle Power per Cubic Foot of Gas.



General Agents:

SIEMENS LIGHTING CO., 347 West Main St., Louisville, Ky.
MEYER, MARSHALL & CO., 528 California St., San Francisco.
DENNEHY, WOLF & O'BRIEN, 85 & 87 Dearborn St. Chicago, Ill.
WILCOX & McCEARY, - No. 11 Bissel Block, Pittsburgh, Pa.
T. T. RAMSDELL & CO., - 20 Swan Street, Buffalo, N. Y.
SIEMENS GAS ILLUMINATING CO., Room 6, No. 157 Broadway, New York City.
W. D. COLT, - - - - 1420 F Street, Washington, D. C.
JOHN KIEFER, - - - 344 Lawrence, Street, Denver, Col.

THE SIEMENS REGENERATIVE GAS LAMP COMPANY,

SOLE MAKERS FOR THE UNITED STATES,

N. E. Cor. 21st. St. and Washington Av., Philadelphia, Pa.

THE "STANDARD" WASHER-SCRUBBER,

KIRKHAM, HULETT & CHANDLER'S PATENT.

Total Capacity per 24 Hours of "Standard" Washers Ordered During the Following Years.

1877	4,000,000 cubic feet.
1878	4,750,000 "
1879	24,545,000 "
1880	42,967,500 "
1881	36,462,500 "
1882	39,300,000 "
1883	57,735,000 "
1884	26,177,500 "
Total	235,937,500 cubic feet.

Total Number and Capacity per 24 Hours of "Standard" Washers Erected and in Course of Erection in the Several Countries

	Number.	Cubic Feet per Day.
Great Britain	151	157,070,000
Western Hemisphere	38	39,337,500
Australia	18	12,150,000
New Zealand	2	650,000
France	6	4,550,000
Belgium	8	5,430,000
Germany	16	8,300,000
Holland	4	4,160,000
Denmark	1	150,000
Russia	2	3,500,000
Spain	1	350,000
India	1	400,000
Total	248	235,937,500

THE CONTINUED POPULARITY

Of these Machines

Will be recognized from the following extracts from letters from representatives of some of the companies having them in use:

PROVIDENCE GAS COMPANY,
PROVIDENCE, R. I., Nov. 24, 1884.

GEO. SHEPARD PAGE, Esq., New York:

Dear Sir—We are now using less than a gallon of water per thousand in the "Standard," and the gas at the outlet will not color turmeric paper.

Yours. etc.,
A. B. SLATER, Treasurer.

PORTLAND GAS COMPANY.
PORTLAND, ORE., Nov. 29, 1884.

GEO. SHEPERD PAGE, New York:

Dear Sir—Our Scrubber appears to run to our entire satisfaction, and we are pleased to say that it takes out all the ammonia from the gas. This is *very* satisfactory to us, as we were ruining our meters at a fearful rate heretofore. The amount of water used is very inconsiderable as compared with our old process. The machine runs very smooth and still. Very respectfully,

H. C. LEONARD, Secretary.

"Standard" Washers Ordered Recently.

	Cu. Ft. per Day
Anneberg Gas Co	200,000
Bombay Gas Co	400,000
Brussels Co	1,250,000
CHICAGO, two, 1,000,000 each	2,000,000
Chemnitz Gas Co	1,000,000
CITIZENS GAS CO., BUFFALO	750,000
Coke Works in Zabre, Ober-Schlesien	1,500,000
Cokerei der Friedenshutte, Upper Silesia	200,000
Dumfries Corporation	250,000
Dunedin Gas Co., New Zealand	400,000
GEORGETOWN, D. C	250,000
King's Lynn Gas Co	800,000
Leiden, Holland	600,000
Lincoln Gas Co	400,000
Liverpool Gas Co	2,000,000
" "	3,000,000
LOUISVILLE GAS CO	1,500,000
Numea Gas Co	100,000
PITTSBURGH GAS CO	1,500,000
PAWTUCKET, R. I	500,000
PORTLAND GAS CO., Oregon	562,500
SAN FRANCISCO GAS CO	4,000,000
Sheepbridge	40,000
ST. LOUIS GAS CO	2,000,000
Sydney Gas Co	2,500,000
WASHINGTON, D. C. GAS CO	2,000,000
Whitchurch Gas Co	175,000
Total	29,677,500

GEO. SHEPARD PAGE, No. 69 WALL STREET, NEW YORK,

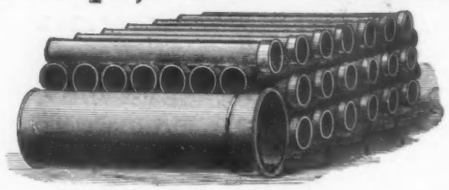
SOLE AGENT FOR THE WESTERN HEMISPHERE.

R. D. WOOD & CO.,

400 Chestnut Street, Phila., Pa.

Cast Iron Gas & Water Pipe, Water Machinery & Gas Apparatus

Cast Iron Pipe, Fire Hydrants, Eddy Valves, Lamp Posts, Large Loam Castings, Flanged Pipe, Sugar House Work, Iron Roofs and Floors, Wrought & Cast Iron Tanks, Turbine Water Wheels and Pumps.



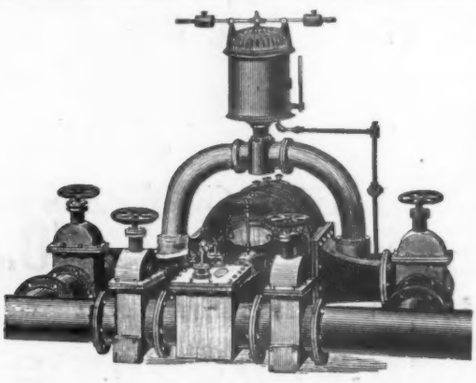
Gasholders, Lime Trays, Center Valves, Purifiers, Bench Work, Exhausters, Condensers, Governors, Scrubbers, Gas Valves Station Meters, Cast Iron Pipe Fittings.

Manufacturers of Heavy Castings and Machinery of Every Description.

ENGINEERS & CONTRACTORS FOR THE ERECTION OF GAS WORKS, & ALL MACHINERY CONNECTED THEREWITH

Estimates and specifications furnished for erection of new works or the extension or alteration of old ones.

Foundries and Works. - - Millville, Florence, and Camden, N. J.



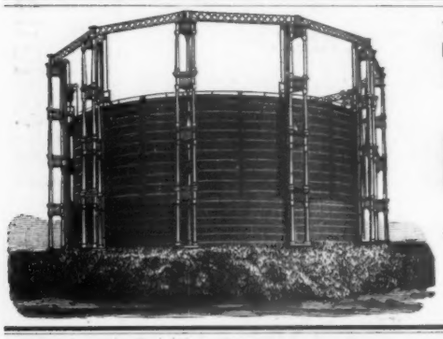
SMITH & SAYRE MFG. COMPANY,

G. G. PORTER, Prest. *245 Broadway, N. Y.* CHAS. W. ISBELL, Sec'y.

Machinery & Apparatus for Gas Works

Drawings, Plans, and Estimates Furnished for the Improvement, Extension, or Alteration of Gas Works, or for the Construction of New Works.

Mackenzie's Patent Rotary and Steam Jet Gas Exhausters, Governors, Compensators, Condensers, Washers, Scrubbers. Isbell's Patent Automatic Street Pressure Governor, Gas and Water Valves, Hydraulic Main Dip Regulator, Bench Castings, etc. Purifying Boxes and "Standard" Scrubbers. Isbell's Patent Self-Sealing Retort Doors.



W. E. Tanner, Pres., W. R. Trigg, V.-Pres., A. Delaney, Supt.

Tanner & Delaney Engine Co.

RICHMOND, VA.

Gas Apparatus,

INCLUDING

Condensers of various styles, Scrubbers, Holders, Purifiers, Castings for Retort Houses, Etc.

ALSO STEAM ENGINES AND BOILERS.

Plans, Specifications and Estimates Furnished.

MORRIS, TASKER & CO.,

Limited,

Builders of Gas Works,

PHILADELPHIA, PA.

SOUTHWARK FOUNDRY AND MACHINE COMPANY,

Successors to MERRICK & SONS. Established in 1836.

No. 430 Washington Avenue, Philadelphia, Pa.

MANUFACTURERS OF

Single and Telescopic Gasholders,

BENCH CASTINGS,

Washers, Scrubbers, Condensers, Purifiers,

And all apparatus necessary for the construction of improved new gas works and in the extension of established works. Also manufacturers of

Gas Engines, and of all descriptions of Steam and Hydraulic Machinery, and of Boiler and Tank Work.

Plans, specifications, and estimates furnished promptly on application.

To Gas Companies.

We make to order **CAP BURNERS** to burn any amount under a stated pressure. Send for samples.

Also, SERVICE CLEANERS, DRIP PUMPS, and STREET MAIN PROVING APPARATUS.

C. A. GEFRORER,

248 N. 8th Street, Phila., Pa.

WM. HENRY WHITE,

Consulting & Constructing

Gas Engineer & Contractor,

ESTIMATES, PLANS, AND SPECIFICATIONS FURNISHED FOR NEW WORKS OR EXTENSIONS OF EXISTING WORKS.

32 Pine St., New York City.

Correspondence solicited.

KERR MURRAY MFG. CO.,

MANUFACTURERS OF

Single Lift and Telescopic

GASHOLDERS.

Built, 1884:

Altoona, Pa	Capacity,	160,000	cubic feet.
Pittsburgh, Pa	"	250,000	"
" "	"	230,000	"
Bellaire, Ohio	"	50,000	"
Youngstown, Ohio	"	60,000	"
Canton, "	"	60,000	"
Akron, "	"	80,000	"
Xenia, "	"	10,000	"
Adrian, Mich	"	65,000	"
Ypsilanti, Mich	"	25,000	"
Muskegon, "	"	70,000	"
South Bend, Ind	"	70,000	"
Anderson, "	"	20,000	"
Plainfield, "	"	10,000	"
Springfield, Illinois	"	100,000	"
Evanston, "	"	50,000	"
Freeport, "	"	35,000	"
Elgin, "	"	60,000	"
Sheboygan Wis	"	20,000	"
Key West Fla	"	10,000	"

Plans and estimates furnished for the erection of new and the rebuilding of old works. Address

Kerr Murray Mfg. Co.,

FORT WAYNE, IND.

JAMES R. FLOYD,

(SUCCESSOR TO HERRING & FLOYD)

Oregon Iron Works,

531 to 543 West 20th St., N. Y.

Practical Builders of Gas Works,

MANUFACTURERS OF

ALL KINDS OF CASTINGS
AND
APPARATUS FOR GAS-WORKS.

BENCH CASTINGS
from benches of one to six Retorts each.
WASHERS: MULTITUBLAR AND AIR CONDENSERS; CONDENSERS; SCRUBBERS
wet and dry), and
EXHAUSTERS
for relieving Retorts from pressure.
BENDS and BRANCHES
of all sizes and description.
FLOYD'S PATENT MALLEABLE RETORT LID.
PATENT SELF-SEALING RETORT LIDS.
FARMER'S PATENT BYE-PASS DIP-PIPE.
SABBATON'S PATENT FURNACE DOOR AND FRAME.
BUTLER'S COKE SCREENING SHOVELS.

GAS GOVERNORS,

and everything connected with well regulated Gas Works at low price, and in complete order.

SELLER'S CEMENT

for stopping leaks in Retorts.

N B.—**STOP VALVES** from three to thirty inches—at very low prices.

Plans, Specifications, and Estimates furnished.

CONTINENTAL WORKS.

GASHOLDERS OF ANY MAGNITUDE.

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GREENPOINT, BROOKLYN, N. Y.
ENGINEER AND MANUFACTURER OF

GAS-HOLDERS.

CONDENSERS, SCRUBBERS, VALVES, PURIFIERS, RETORTS, and HYDRAULIC MAINS,

and all other articles connected with the Manufacture and Distribution of Gas. Plans and Specifications prepared and Proposals given for the necessary Plant for Lighting Cities, Towns, Mansions, and Manufactories.

H. RANSHAW, Prest. & Mangr. WM. STACEY, Vice-Pres. T. H. BIRCH, Asst. Mangr. R. J. TARVIN, Sec. & Treas.

STACEY MFG. CO.,

MANUFACTURERS OF

Single and Telescopic Gasholders,

IRON ROOFS, BRIDGES, LAMP POSTS,

Water and Oil Tanks, Coal Elevator Cars,

COKE CRUSHERS, BENCH CASTINGS,

And all kinds of Wrought and Cast Iron Work used in the erection of Coal and Oil Gas Works. Rolling Mill Machinery and Heavy Castings a Specialty.

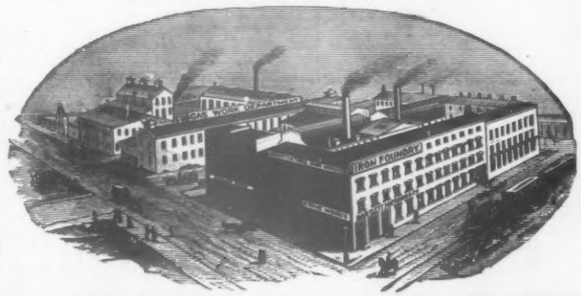
Foundry: 33, 35, 37 & 39 Mill Street. **Wrought Iron Works:** 16, 18, 20, 22, 24 & 26 Ramsey Street.

Cincinnati, Ohio.

BARTLETT, HAYWARD & CO.,

Office, 24 Light. **BALTIMORE, MD.** Works, Pratt &

PURIFIERS. Roofs. Bench Castings.



SCRUBBERS. BOILERS. CONDENSERS.

GASHOLDERS.

CONSTRUCTING ENGINEERS AND BUILDERS OF GAS WORKS.

1842. **DEILY & FOWLER,** 1884.

Laurel Iron Works.

Address, No. 39 Laurel Street, Philadelphia, Pa.

MANUFACTURERS OF

GASHOLDERS,

Single or Telescopic, with Cast or Wrought Iron Guide Frames.

Holders Built Since 1880:

Mount Joy, Pa.
Rockaway B'ch, N.Y. (2)
Zanesville, O. (2d.)
Lancaster, O.
Blackwell's Island N. Y.
Waltham, Mass., (1st.)
Dorchester, Mass.
Wheeling, West Va.
Lansing, Mich.
Flint, Mich.
Galveston, Texas (1st.)
Milton, Pa.
Scranton, Pa.
West Point, N. Y.
Fitchburgh, Mass.
New London, Conn.
Derby, Conn.
Bridgeport, Conn.
Allegheny, Pa. (1st.)
St. Hyacinth, Can.
Norwalk, O.
Brattleboro, Vt.
Waltham, Mass (2d.)
West Chester, Pa.
Baltimore, Md.
Hollidaysburg, Pa.
Galveston, Texas (2d.)
Marlboro, Mass.
Denver, Col.
Chicago, Ill. (West Side).
Pittsburgh, Pa. (S. Side).
Pawtucket, R. I.
Brookline, Mass.
Sherbrooke, Can.
Burlington, N. J. (2d.)
Bridgeton, N. J.
Bay City, Mich.
Erie, Pa.
Jackson, Mich.
Kalamazoo, Mich. (3d.)
Glen Island, N. Y.
Warren, Ohio.
Bath, N. Y.
Lynn, Mass.
New Bedford, Mass.
Waterbury, Conn.
Deseronto, Can.
Hoosic Falls, N. Y. (2d.)
Bethlehem, Pa.
Atlanta, Ga. (1st.)
Savannah, Ga.
Montgomery, Ala
Newport, R. I.
Portland, Oregon.
Allegheny, Pa. (2d.)
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N.Y.City (Central Ga.)
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Saylesville, R. I.
Rondout, N. Y.
Atlantic City, N. J.
Augusta, Ga.
Waltham, Mass. (2)

GAS COALS. GAS COALS. GAS COALS.

JAMES D. PERKINS. **PERKINS & CO.,** F. SEAVERNS.

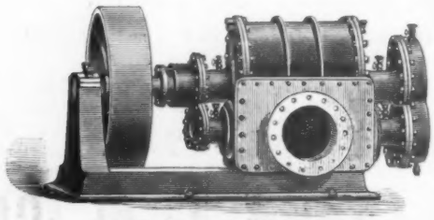
General Sales Agents for

The Youghiogheny River Coal Company's

OCEAN MINE YOUGHIOGHENY GAS COAL.

The Coal from the Ocean Mine (recently operated by Messrs. W. L. Scott & Co., of Erie, Pa.,) is now used by all the leading Gas Companies in the United States from Maine to Texas, and is recognized as *the only reliable Youghiogheny Gas Coal.* (See Map on p. 87 of this Journal, Feb. 16, 1885.)

P. O. Box 3695, New York. **PERKINS & CO., 228 and 229 N. Y. Produce Exchange** BEAVER STREET ENTRANCE.



Gas Exhauster Driven by Belt.

The Wilbraham Gas Exhauster,

"BAKER SYSTEM,"

WITH ENGINE ATTACHED, ON SAME BED PLATE OR WITHOUT.

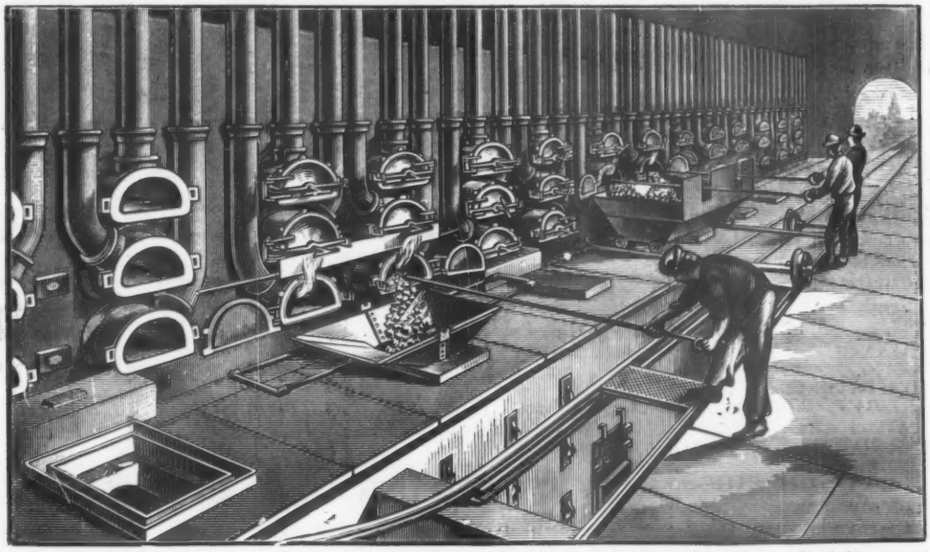
Best, Cheapest and Most Durable Exhauster known.

WILBRAHAM BROS.,

No. 2320 Frankford Avenue, Philadelphia, Pa.

Chas. F. Dieterich's Regenerator Furnace.

CAN BE ADAPTED TO ANY BENCH WITHOUT DISTURBING THE ORDINARY SETTINGS.



These Furnaces have been in operation at the works of the People's Gas Company, Baltimore, since June, 1878. A bench of sixes, with retorts 20 in. by 12 in. by 8 ft. 6 in. will burn off 1,350 pounds of coal in 3 hours. Twenty-five per cent. of the coke is sufficient to thoroughly burn off the charges.

We refer by permission to the following Companies who are using these Furnaces:

A. B. SLATER, Providence Gas Co. **S. G. STINESS,** Pawtucket Gas Co. **JAS. H. ARMINGTON,** Brooklyn Gas Lt. Co.

State, city, and factory rights granted on reasonable terms. For full particulars apply to

CHAS. F. DIETERICH, Engineer P. O. Box 512, BALTIMORE, MD.

GAS COALS. GAS COALS. GAS COALS,

Newburgh Orrel Coal Co.,

MINERS AND SHIPPERS OF

Newburgh Orrel, Tyrconnell and Palatine Gas Coals.

ALSO SHIPPERS OF FOUNDRY COKE.

Mines Situated at

Newburgh, Flemington & Fairmont, W.Va.

HOME OFFICE,

25 S. Gay St., Baltimore.

CHARLES MACKALL,
MANAGER,

CHAS. W. HAYS, Agent in New York,

Room 92, WASHINGTON BUILDING, **No. 1 Broadway.**

Shipping wharves at Locust Point. References furnished when required. Special attention given to chartering vessels.

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

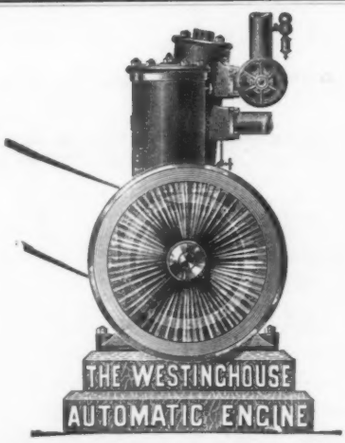
To Gas Light Companies and Manufacturers of Fire Clay Goods Throughout the Country.

ROUSSEL & HICKS, 71 Broadway, N. Y. } *AGENTS.* { BANGS & HORTON, 16 Kilby St., Boston.

Mines in Harrison Co., West Va. Wharves, Locust Point, Balt.

Company's Office, 15 German St., Baltimore, Md.

Among the consumers of Despard Coal we name: Manhattan Gas Light Co., N. Y.; Metropolitan Gas Light Co., N. Y.; Jersey City, (N. J.) Gas Light Co.; Washington (D. C.) Gas Light Co.; Portland (Maine) Gas Light Co. Reference to them is requested.



1,500 Engines Now in Use.

Our capacity being now equal to 100 Engines per month, we shall hereafter keep in stock for immediate shipment all sizes from 4 to 200 H.P.

SEND FOR ILLUSTRATED CIRCULAR AND REFERENCE LIST.

Westinghouse Machine Co.,

PITTSBURCH, PA.

SALES DEPARTMENT CONDUCTED BY

Westinghouse, Church, Kerr & Co., 17 Cortlandt Street, New York City.
Fairbanks, Morse & Co., Chicago, Cincinnati, Cleveland, Louisville, and St. Paul.
Fairbanks & Co., St. Louis, Indianapolis, and Denver.
Parke & Lacy, San Francisco, and Portland, Or.
Parke, Lacy & Co., Salt Lake City, Utah, and Butte, Montana.
D. A. Tompkins & Co., Charlotte, N. C.
Keating Implement & Machine Co., Dallas, Texas
Imray & Co., Sydney and Melbourne, Australia.
Robert Middleton, Mobile, Ala.
H. Dudley Coleman, 9 Perdido St., New Orleans, La.
H. Rogers, 43 Rue Laffitte, Paris.

THE

PENN GAS COAL CO.

OFFER THEIR

Coal, Carefully Screened & Prepared for Gas Purposes.

Their Property is located in the Youghiogheny Coal Basin, near Irwin and Penn Stations on the Pennsylvania Railroad, and on the Youghiogheny River.

Principal Office:

209 SOUTH THIRD STREET, PHILA., PA.

Points of Shipment:

Pennsylvania Railroad Piers; Greenwich Wharves, Delaware River; Pier No. 1 (Lower Side), South Amboy, N. J.

Chesapeake & Ohio Railway Coal Agency,

FOR THE SALE OF THE

Superior Kanawha Gas Coals, Cannelton Cannel,

Also, SPLINT AND STEAM COALS,

From the Kanawha and New River Regions, on the line of the Chesapeake & Ohio R'way.

C. B. ORCUTT, Sales Agent. | **OFFICE, 150 BROADWAY, N Y.**

FRANCIS H. JACKSON, PRESIDENT. EDMUND H. McCULLOUGH, SEC. & TREAS.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Penn.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.
WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

The Management of Small Gas Works.

By C. J. R. HUMPHREYS. Price, $1.

A. M. CALLENDER & CO., 42 Pine St., N. Y.

CATHELL'S Gas Consumer's Manual.

Enables every gas consumer to ascertain at a glance, without any previous knowledge of the gas meter, the quantity and money value of the gas consumed. Also the best method of obtaining from gas the largest amount of its light. It will be to the advantage of Gas Companies to supply their consumers with one of these Guides, as a means of preventing complaint arising from their want of knowledge in regard to the registration of meters.

A. M. CALLENDER & CO., 42 Pine St., N. Y

King's Treatise on Coal Gas.

The most complete work on Coal Gas ever published.

Three Vols. Bound, $30.

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AMERICAN GAS LIGHT JOURNAL.

$3.00 per Annum.

A. M. CALLENDER & CO.,

42 Pine Street, N. Y. City.

INTERNATIONAL--1876--EXHIBITION.

The U. S. Centennial Commission

HAVE DECREED AN AWARD TO

HARRIS, GRIFFIN & CO.,

Twelfth and Brown Streets, Philadelphia, Pa., No. 49 Dey Street, N. Y. City, and No. 75 North Clinton Street, Chicago, Ill.,

FOR THE FOLLOWING REASONS:

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Attest—J. L. CAMPBELL, Secretary, pro-tem. Signed—A. T. GOSHORN, Director General J. R. HAWLEY, President

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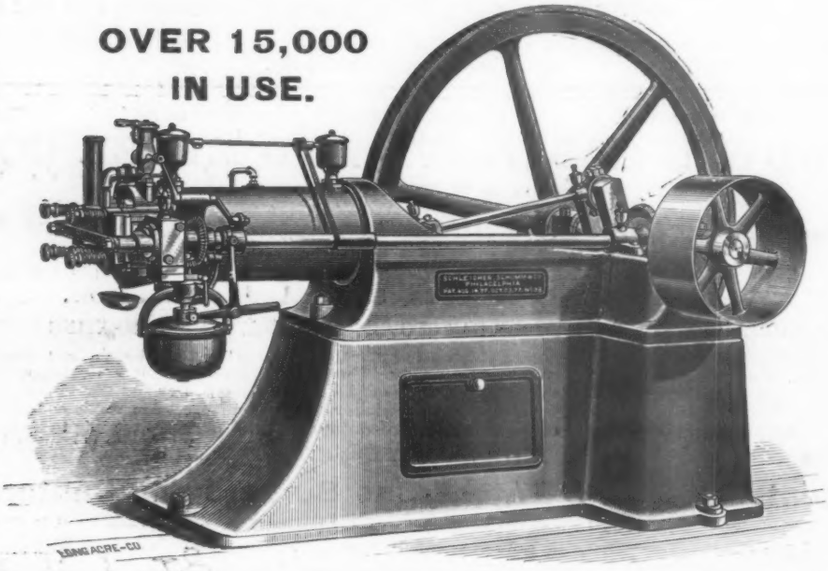

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